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Umekage et al.

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(54) **INDOOR UNIT FOR AIR-CONDITIONING APPARATUS**

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(73) Assignee: **Mitsubishi Electric Corporation**, Tokyo (JP)

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PCT Pub. Date: **Dec. 20, 2018**

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F24F 11/72 (2018.01)
(Continued)

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CPC ***F24F 11/79*** (2018.01); ***F24F 1/0014*** (2013.01); ***F24F 1/0047*** (2019.02); *F24F 2110/10* (2018.01); *F24F 2110/20* (2018.01); *F24F 2120/12* (2018.01); *F24F 2130/00* (2018.01)

(58) **Field of Classification Search**
CPC F24F 1/0014; F24F 11/79; F24F 2120/12; F24F 2110/20; F24F 2110/10; F24F 1/0047; F24F 2130/00
See application file for complete search history.

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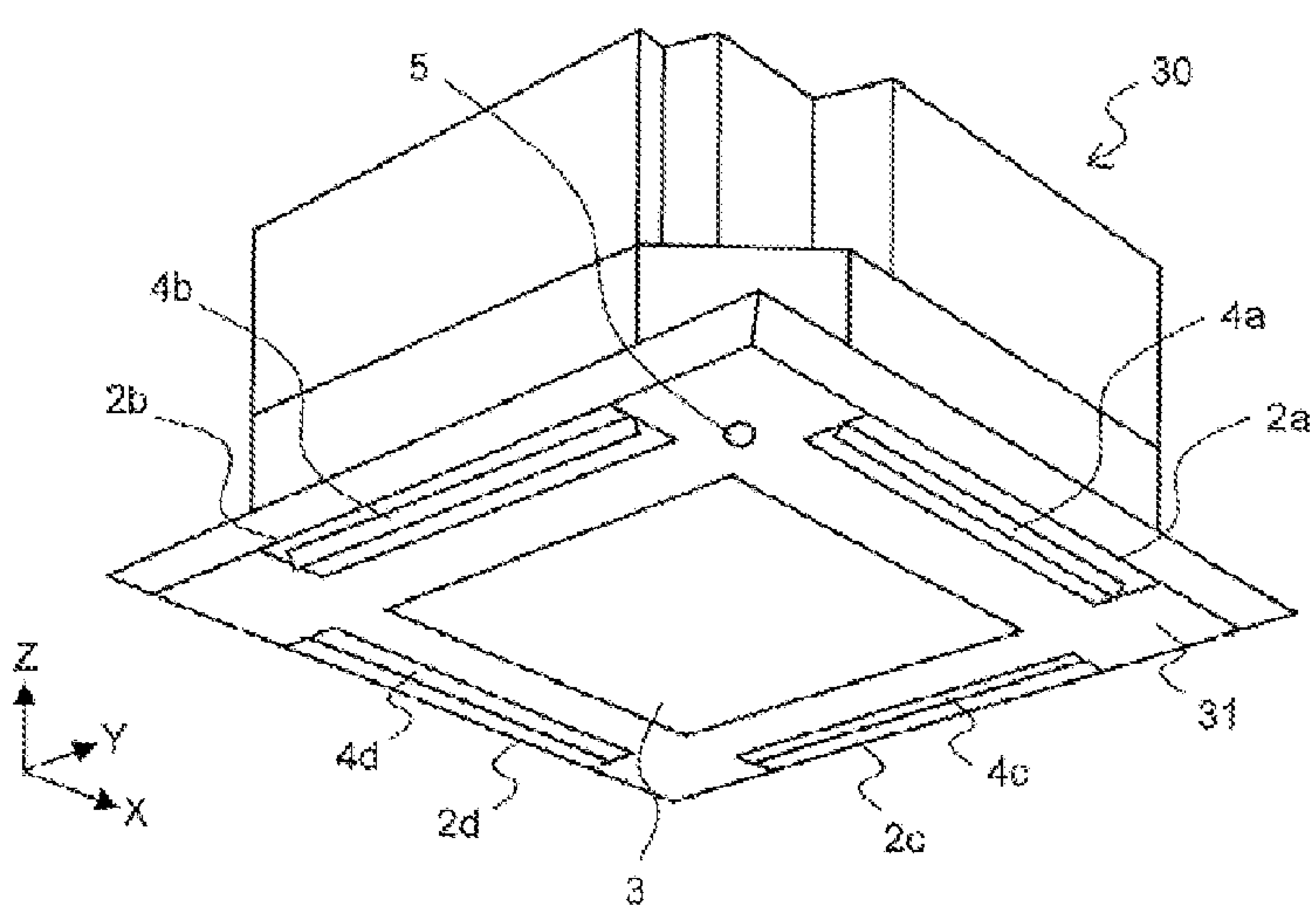
Primary Examiner — Steven S Anderson, II
(74) *Attorney, Agent, or Firm* — Posz Law Group, PLC

(57) **ABSTRACT**

An indoor unit for an air-conditioning apparatus includes an air-sending unit configured to send air subjected to heat exchange with refrigerant to an air-conditioning target space through an air outlet, the air-conditioning target space being divided into a plurality of areas, an up-and-down airflow direction adjuster configured to adjust an angle in an up-and-down direction of a blowing direction of the air sent through the air outlet, a right-and-left airflow direction adjuster configured to adjust an angle in a right-and-left direction of the blowing direction of the air sent through the air outlet, and a controller configured to control the angle of the up-and-down airflow direction adjuster and the angle of the right-and-left airflow direction adjuster. The controller is configured to control the up-and-down airflow direction adjuster and the right-and-left airflow direction adjuster to continuously change the angle in the up-and-down direction and the angle in the right-and-left direction.

13 Claims, 13 Drawing Sheets



(51) **Int. Cl.**

F24F 1/0007	(2019.01)
F24F 1/0047	(2019.01)
F24F 1/0014	(2019.01)
F24F 110/20	(2018.01)
F24F 120/12	(2018.01)
F24F 130/00	(2018.01)
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FIG. 1

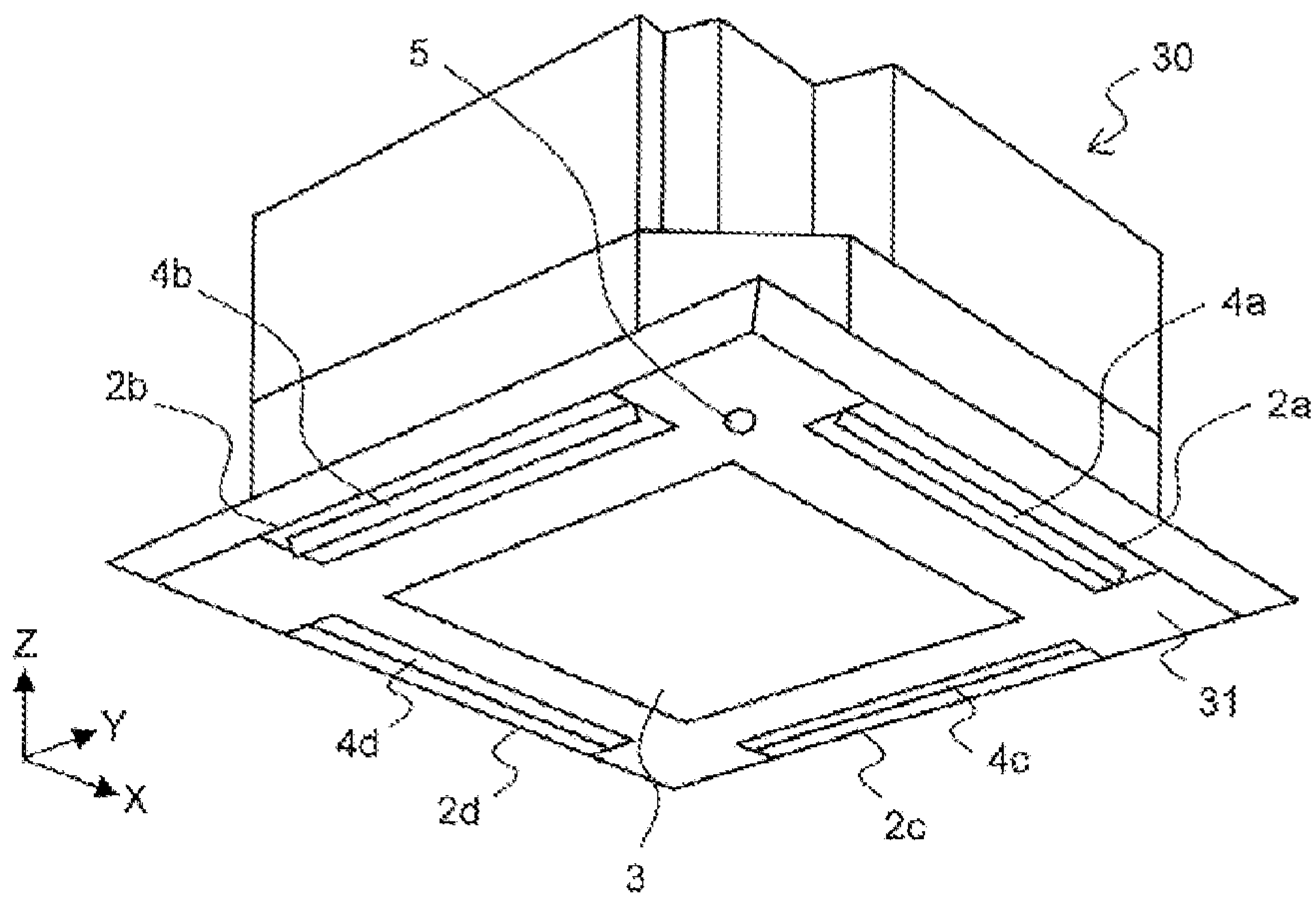


FIG. 2

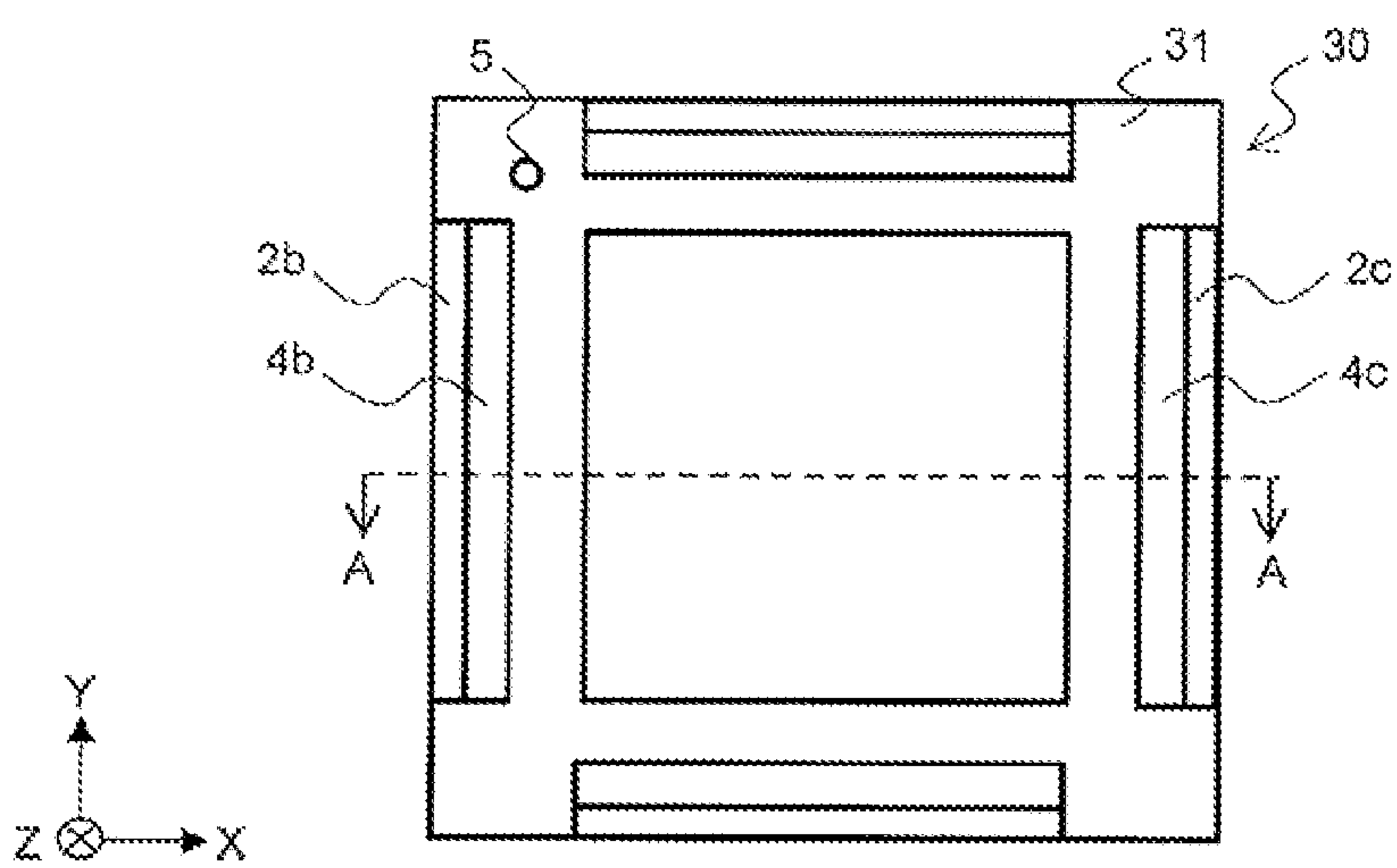


FIG. 3

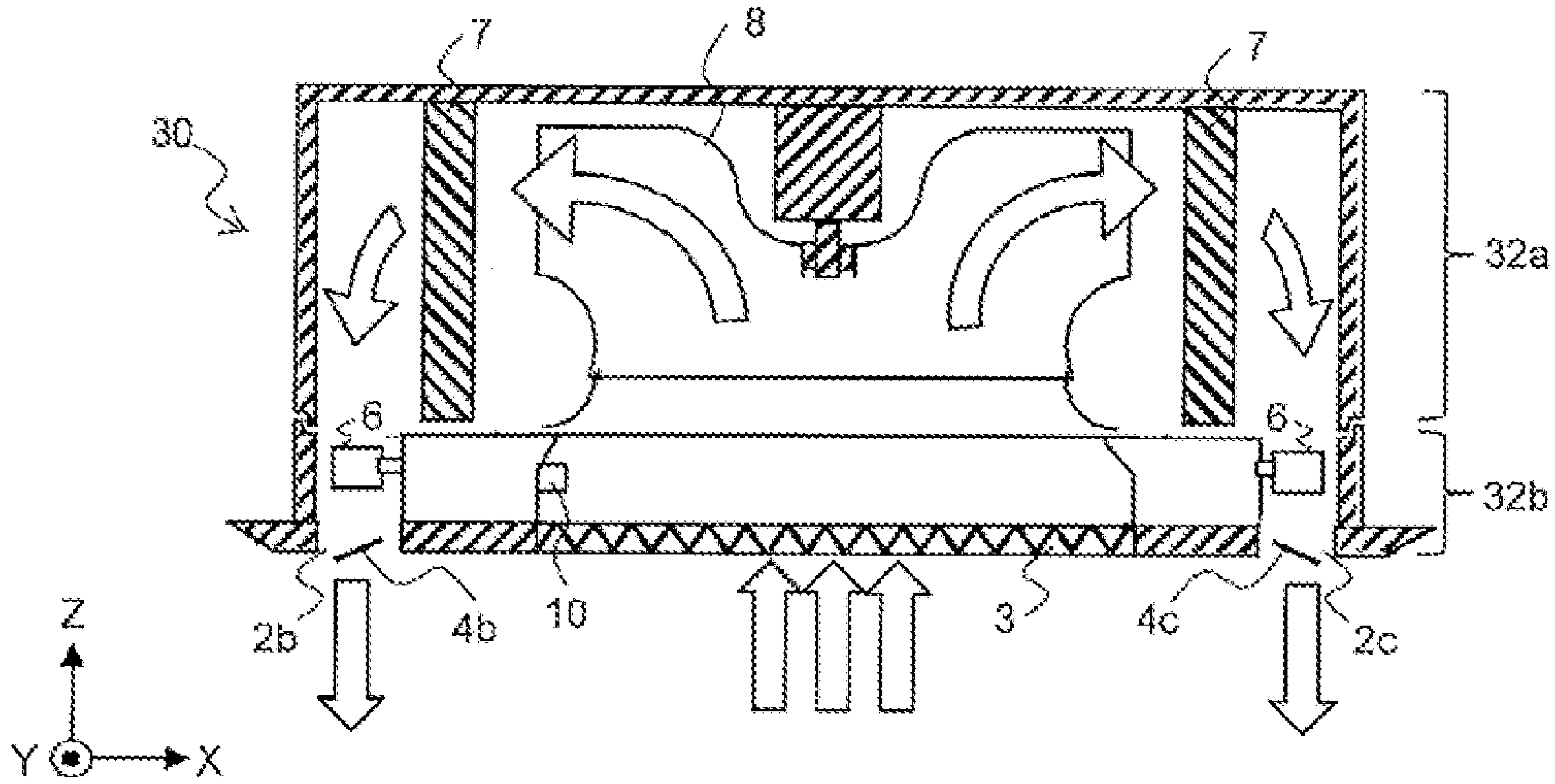


FIG. 4

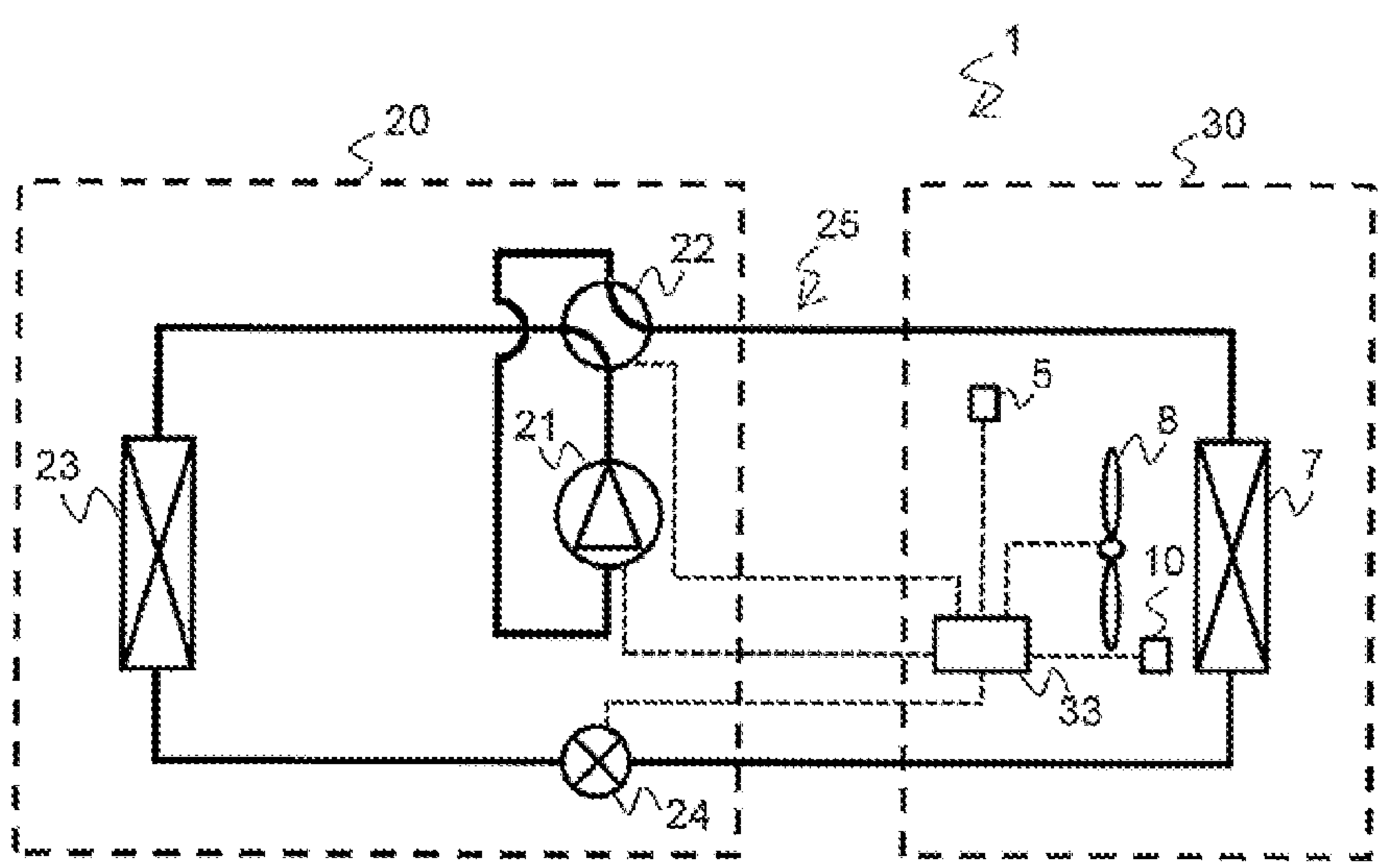


FIG. 5

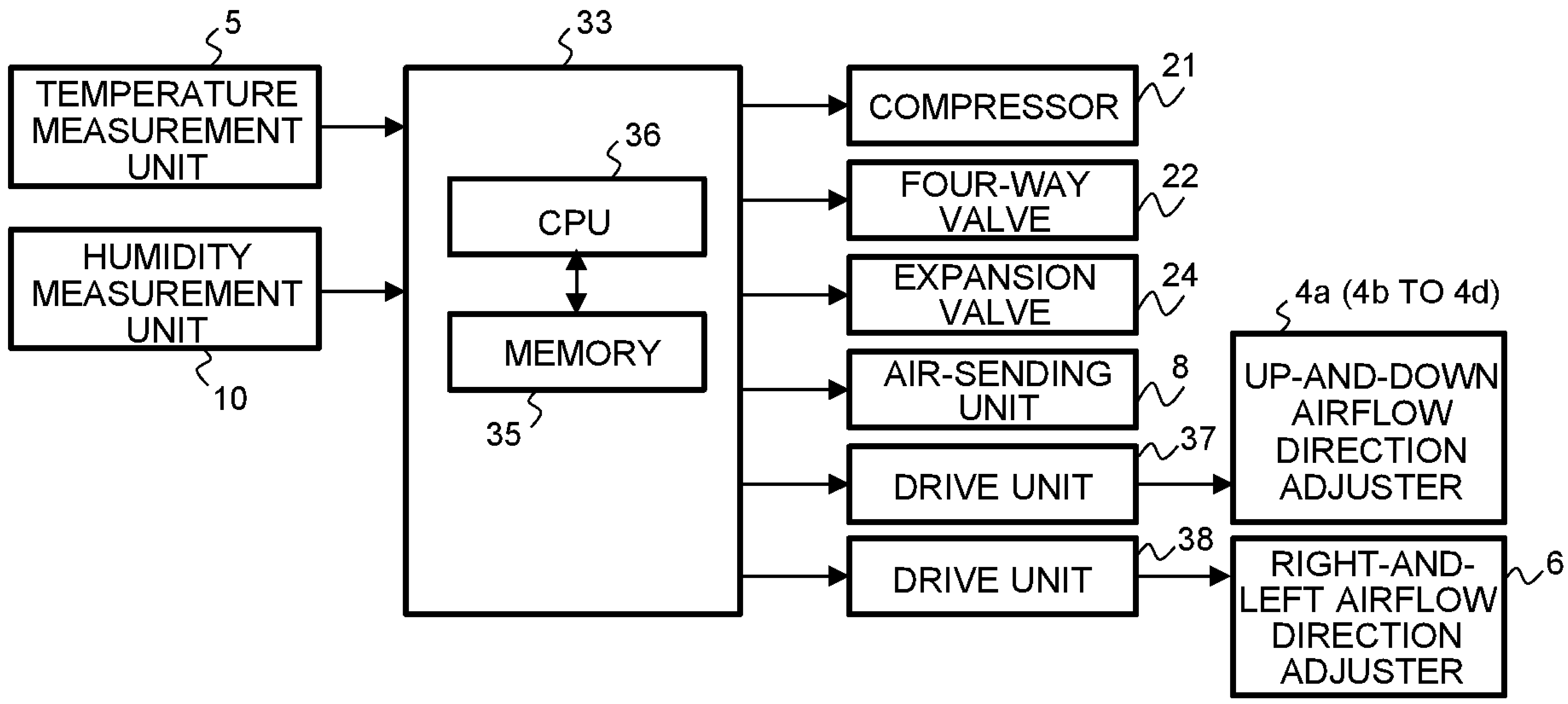


FIG. 6

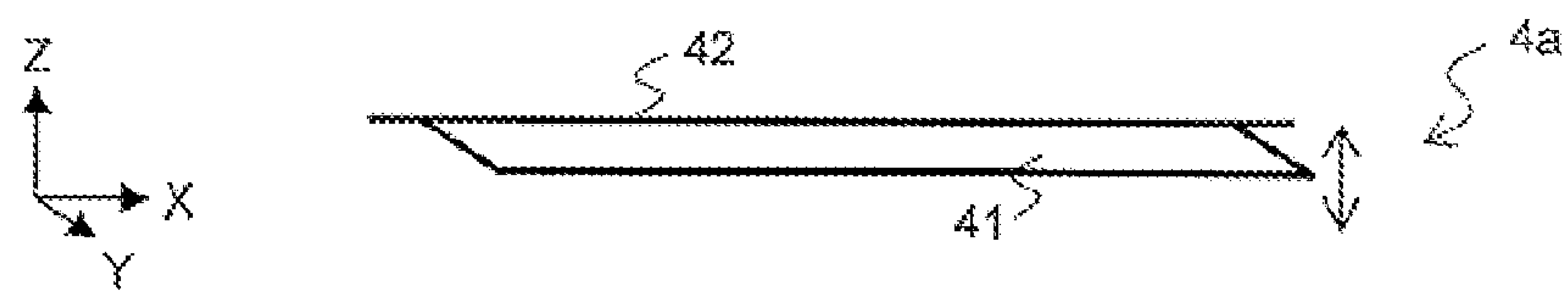


FIG. 7

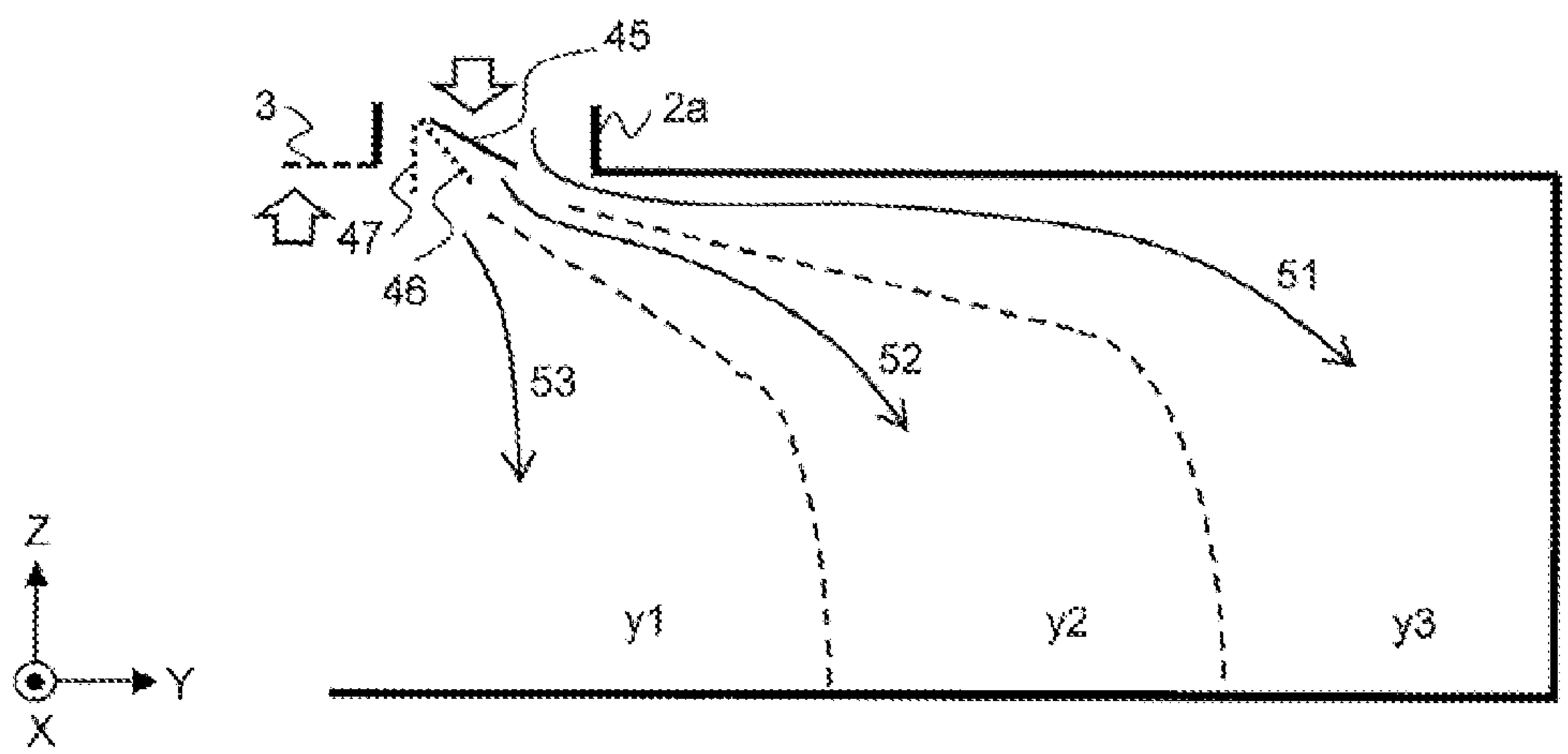


FIG. 8

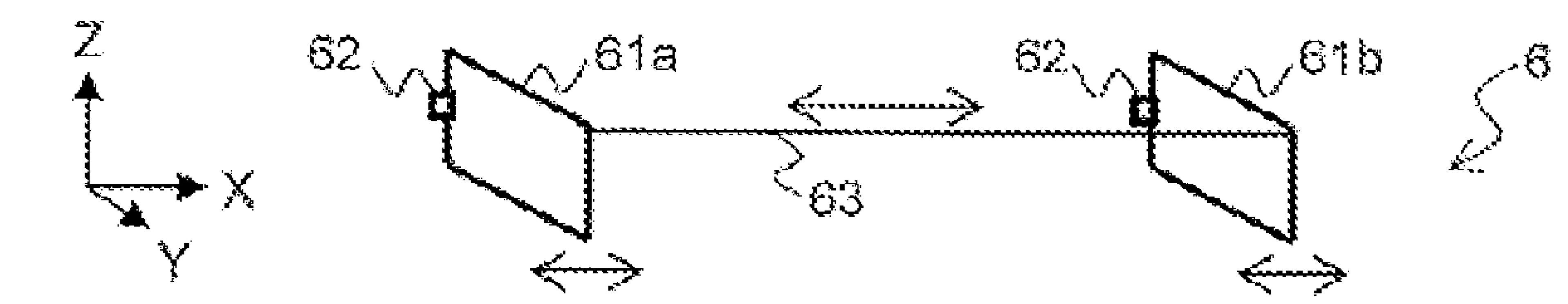


FIG. 9

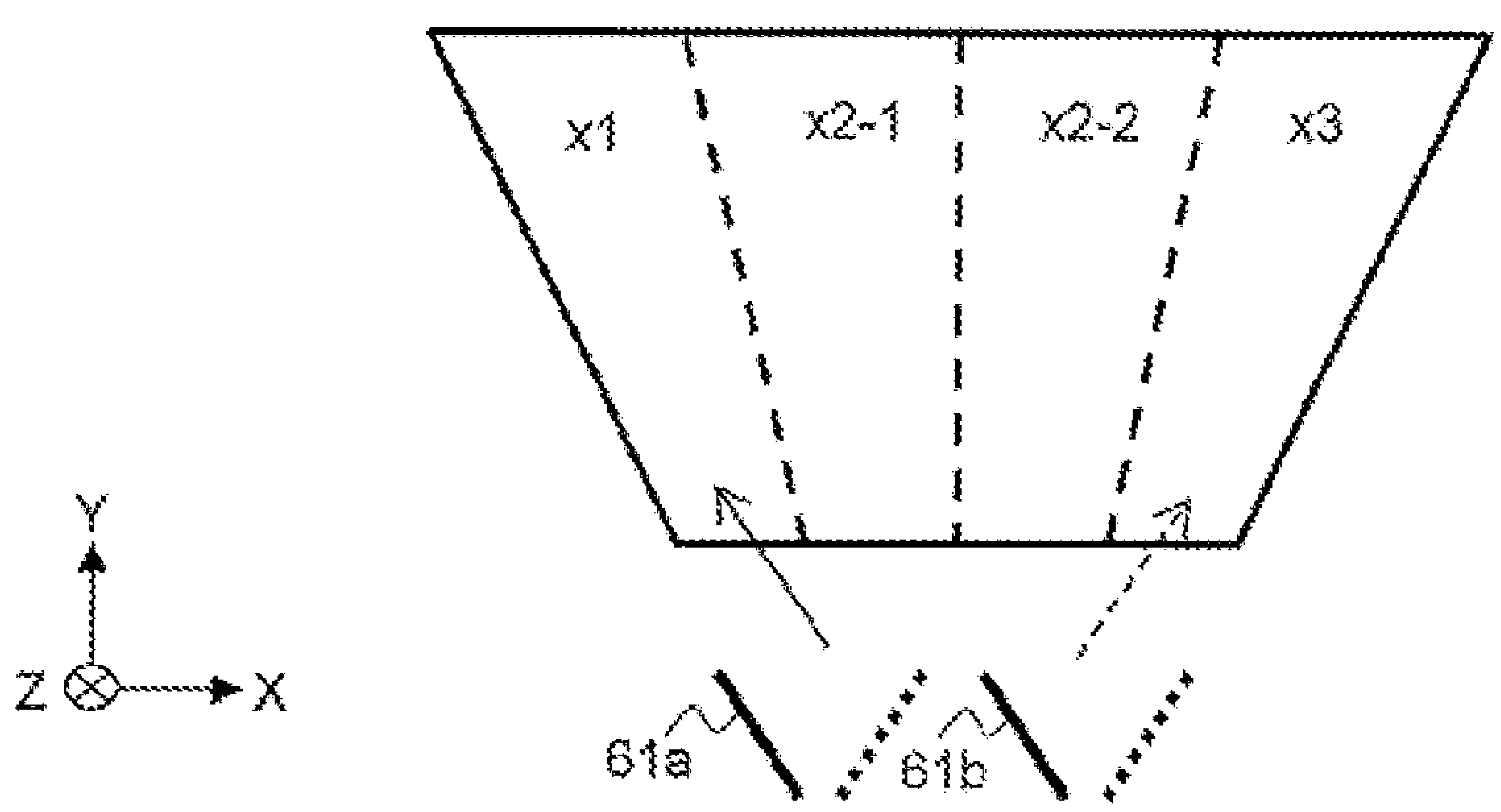


FIG. 10

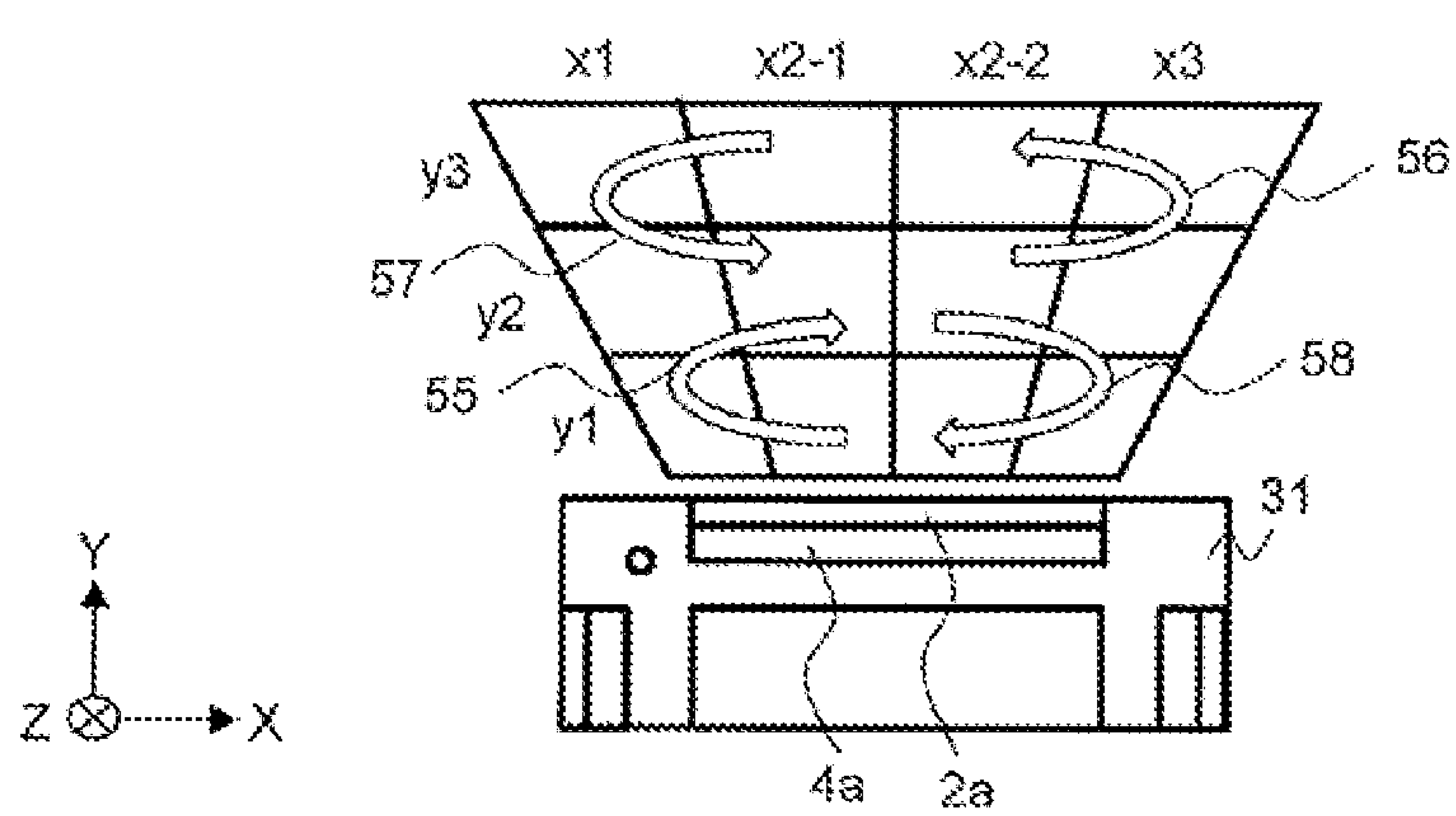


FIG. 11

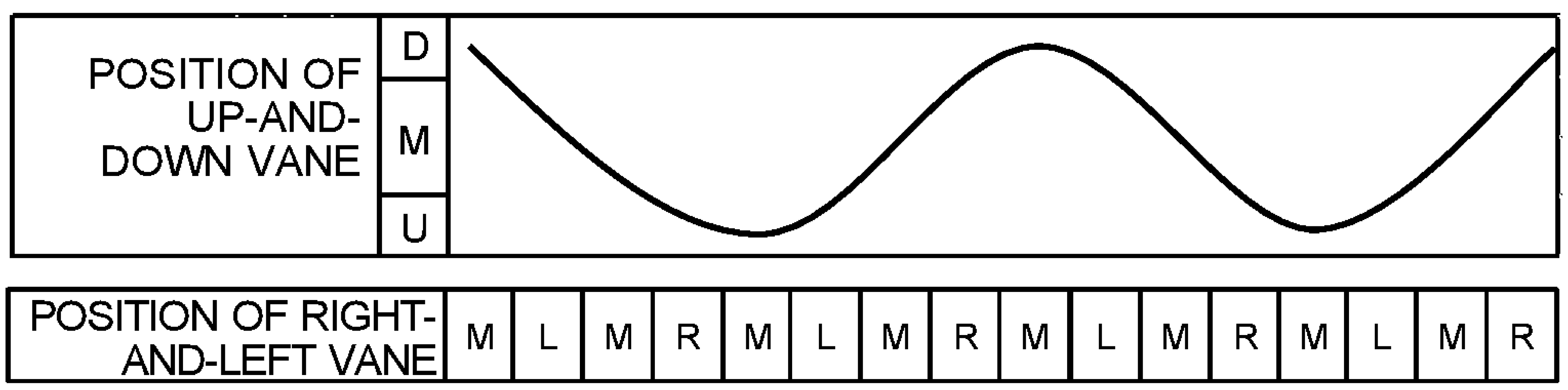

POSITION OF UP-AND-DOWN VANE
D
M
U
POSITION OF RIGHT-AND-LEFT VANE
M L M R M L M R M L M R M L M R

FIG. 12

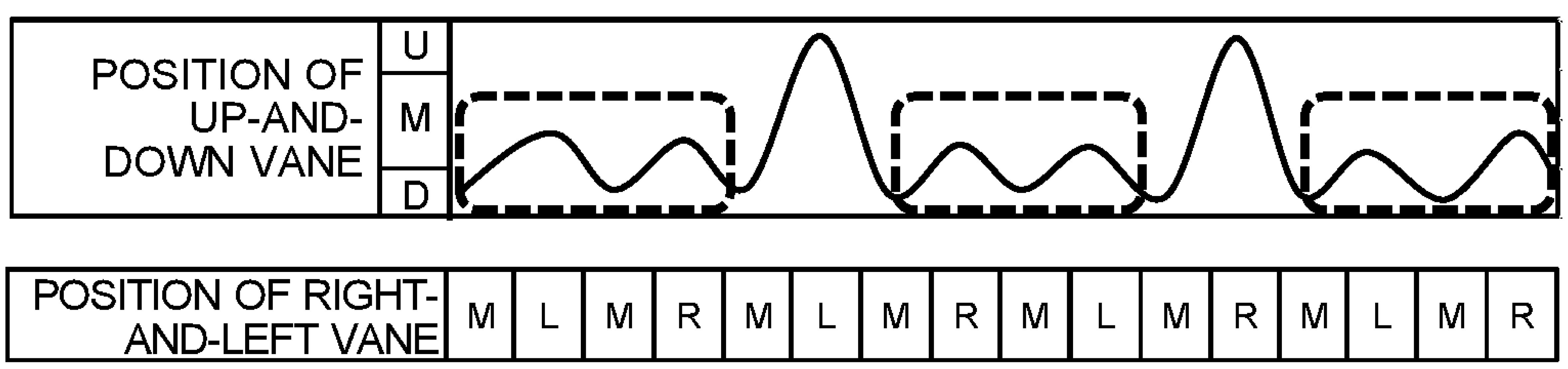

POSITION OF UP-AND-DOWN VANE
U
M
D
POSITION OF RIGHT-AND-LEFT VANE
M L M R M L M R M L M R M L M R

FIG. 13

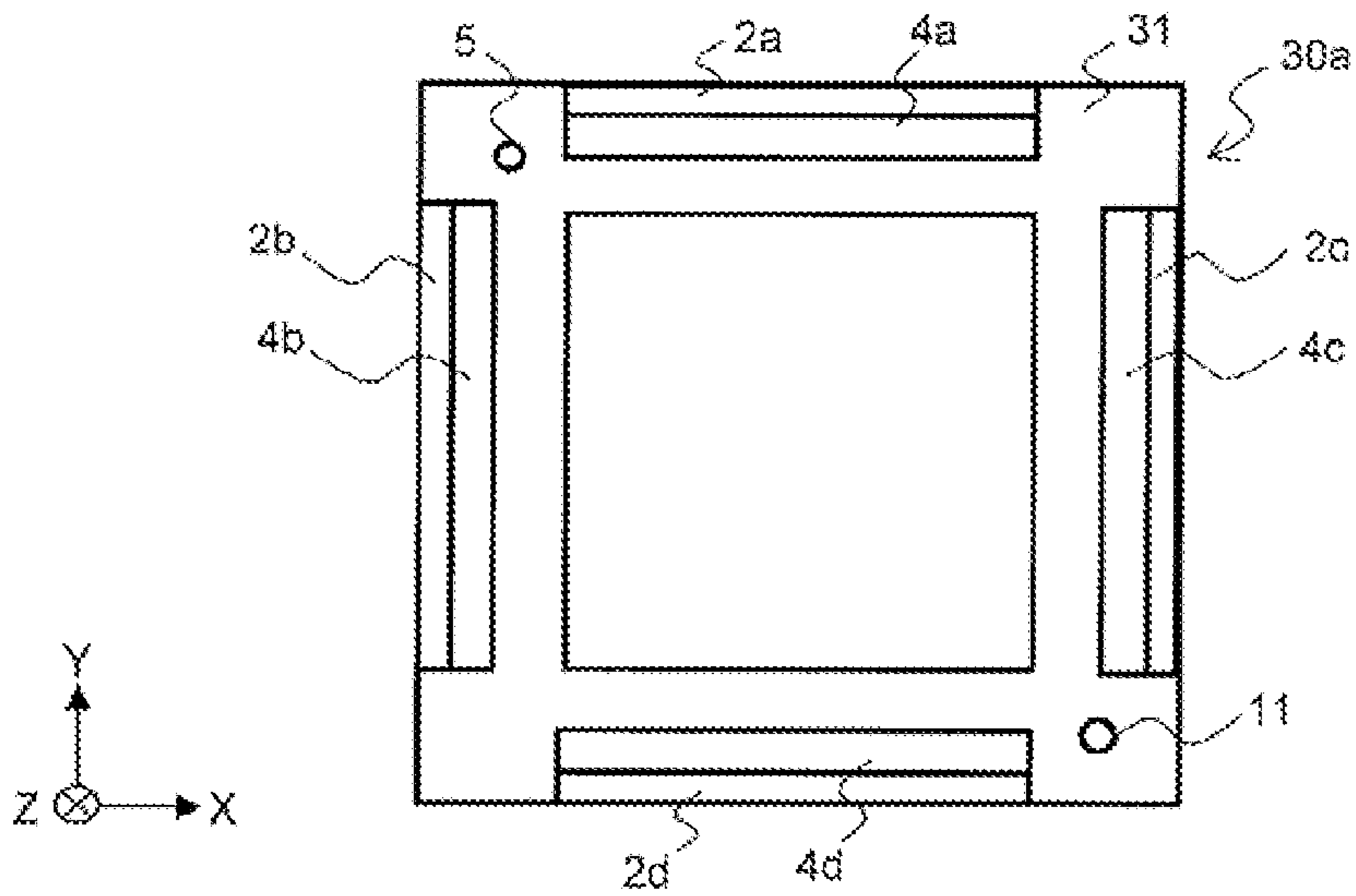

5
2a
4a
31
30a
2b
4b
2c
4c
11
2d
4d
Y
Z
X

FIG. 14

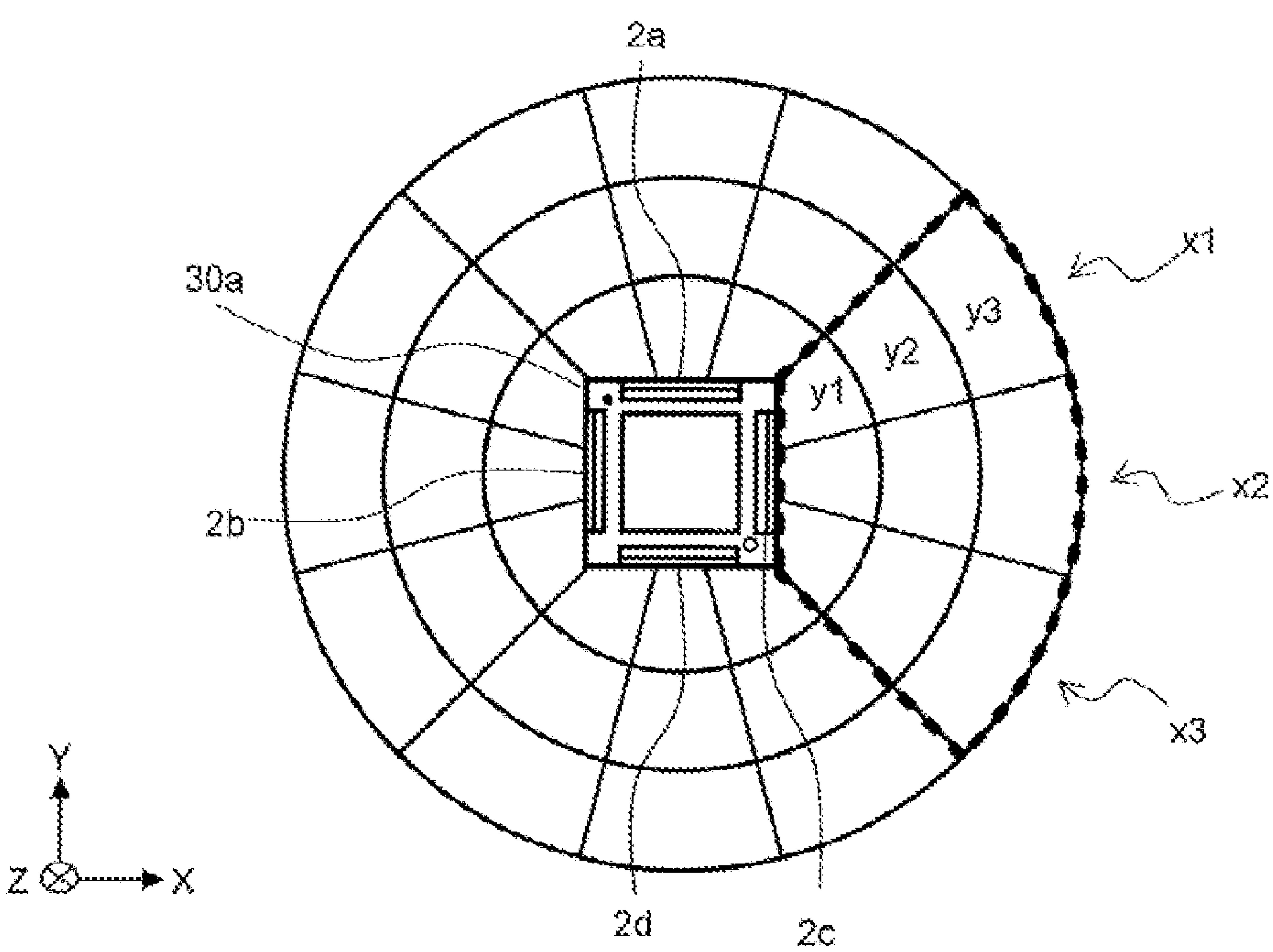

2a
30a
x1
y3
y2
y1
x2
2b
x3
Y
Z
X
2d
2c

FIG. 15

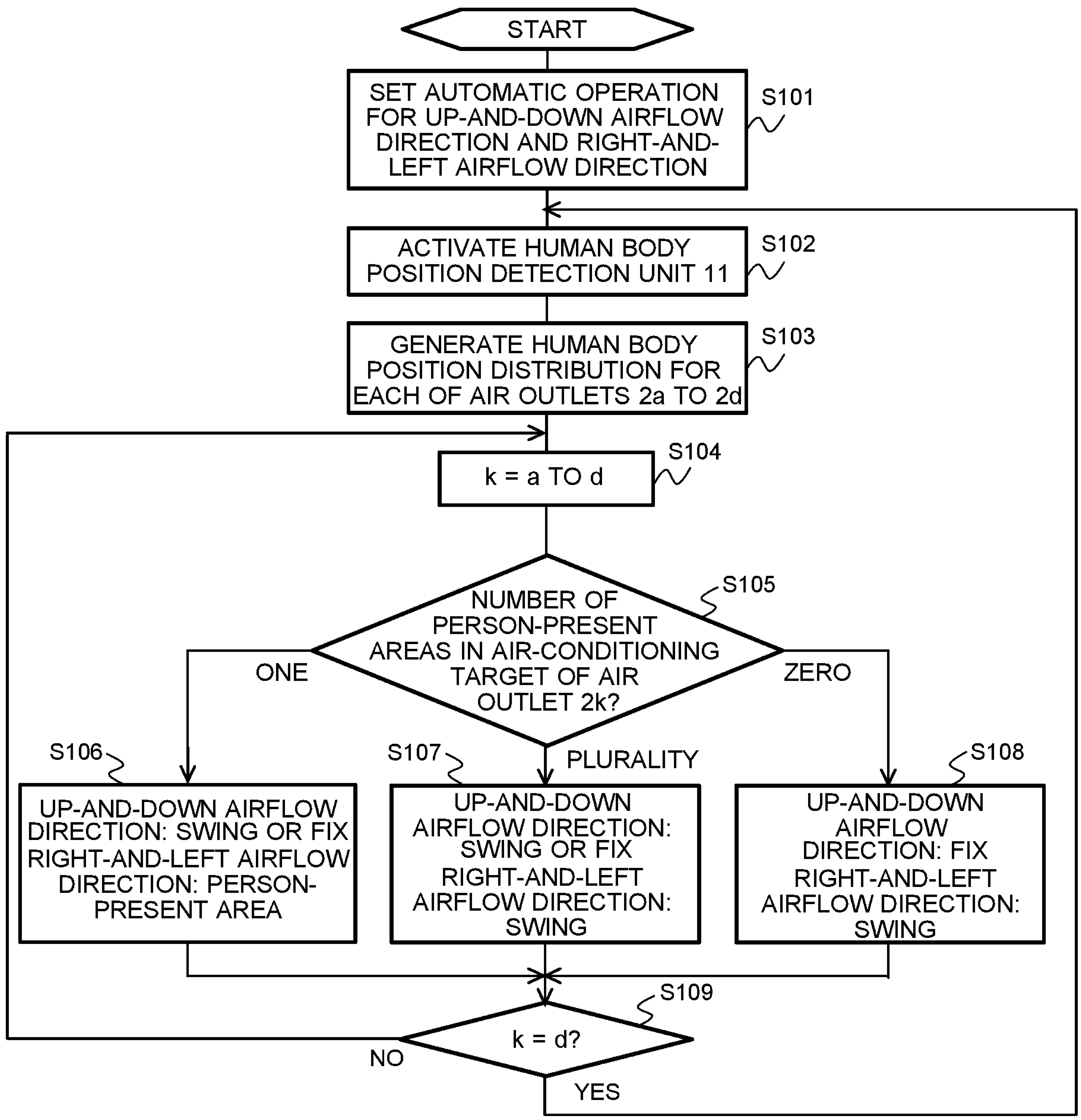

START
SET AUTOMATIC OPERATION FOR UP-AND-DOWN AIRFLOW DIRECTION AND RIGHT-AND-LEFT AIRFLOW DIRECTION
S101
ACTIVATE HUMAN BODY POSITION DETECTION UNIT 11
S102
GENERATE HUMAN BODY POSITION DISTRIBUTION FOR EACH OF AIR OUTLETS 2a TO 2d
S103
k = a TO d
S104
NUMBER OF PERSON-PRESENT AREAS IN AIR-CONDITIONING TARGET OF AIR OUTLET 2k?
S105
ONE
ZERO
PLURALITY
S106
UP-AND-DOWN AIRFLOW DIRECTION: SWING OR FIX RIGHT-AND-LEFT AIRFLOW DIRECTION: PERSON-PRESENT AREA
S107
UP-AND-DOWN AIRFLOW DIRECTION: SWING OR FIX RIGHT-AND-LEFT AIRFLOW DIRECTION: SWING
S108
UP-AND-DOWN AIRFLOW DIRECTION: FIX RIGHT-AND-LEFT AIRFLOW DIRECTION: SWING
S109
k = d?
NO
YES

FIG. 16

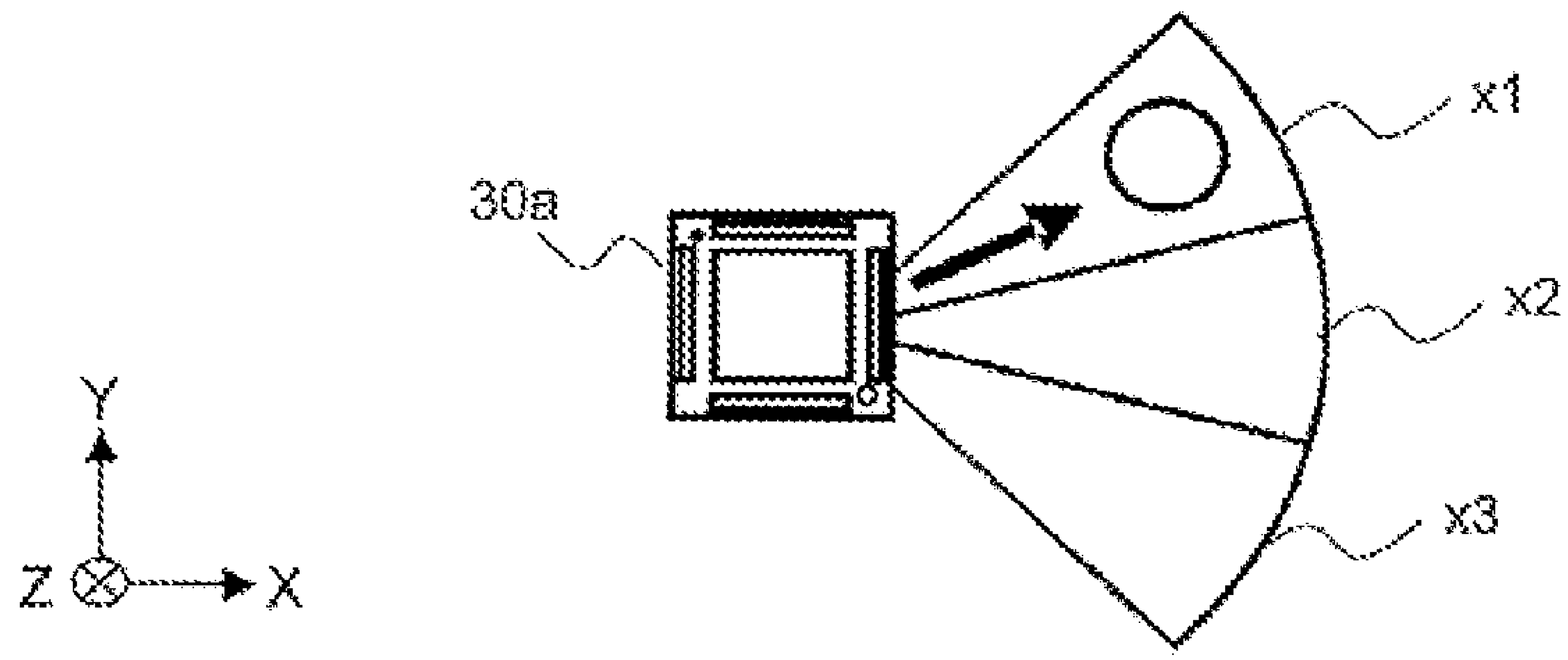


FIG. 17

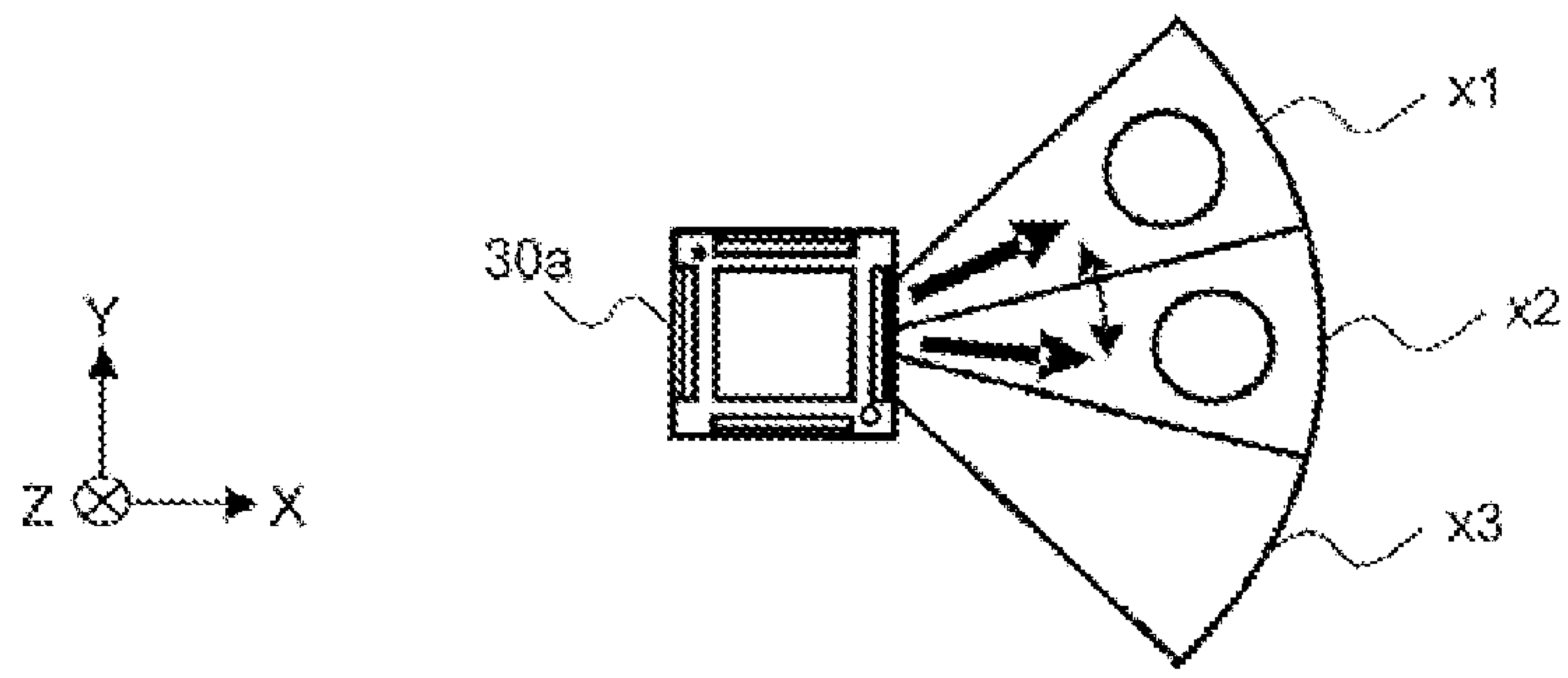


FIG. 18

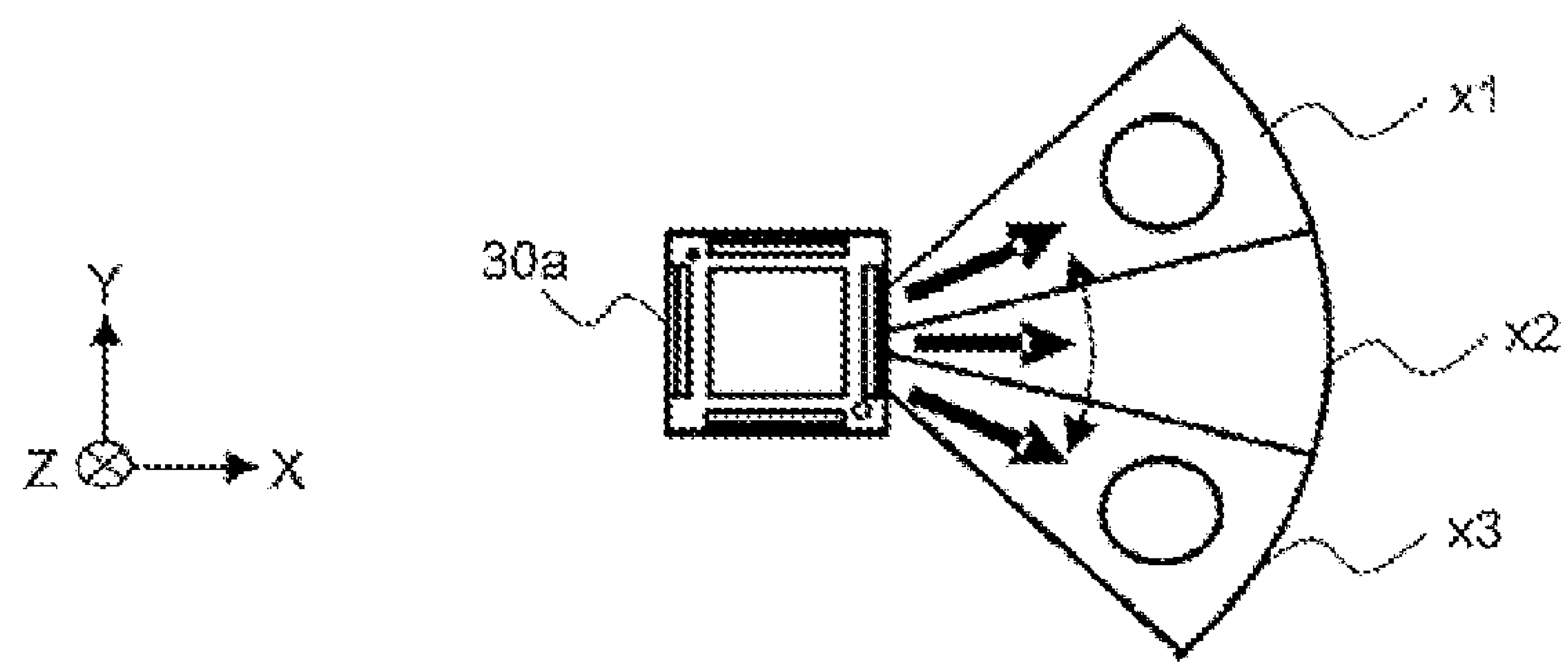


FIG. 19

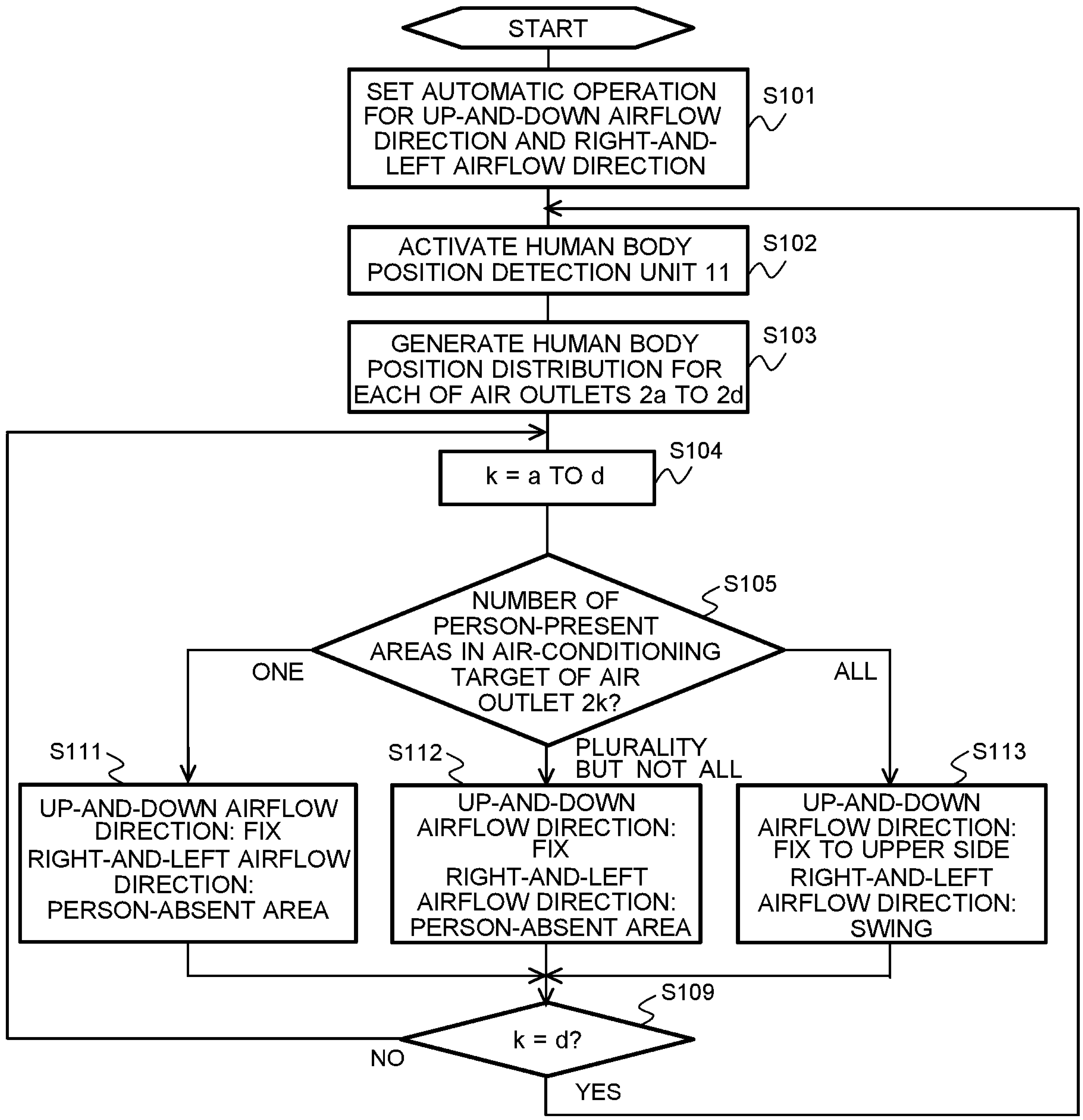

START
SET AUTOMATIC OPERATION FOR UP-AND-DOWN AIRFLOW DIRECTION AND RIGHT-AND-LEFT AIRFLOW DIRECTION
S101
ACTIVATE HUMAN BODY POSITION DETECTION UNIT 11
S102
GENERATE HUMAN BODY POSITION DISTRIBUTION FOR EACH OF AIR OUTLETS 2a TO 2d
S103
k = a TO d
S104
NUMBER OF PERSON-PRESENT AREAS IN AIR-CONDITIONING TARGET OF AIR OUTLET 2k?
S105
ONE
PLURALITY BUT NOT ALL
ALL
S111
UP-AND-DOWN AIRFLOW DIRECTION: FIX
RIGHT-AND-LEFT AIRFLOW DIRECTION: PERSON-ABSENT AREA
S112
UP-AND-DOWN AIRFLOW DIRECTION: FIX
RIGHT-AND-LEFT AIRFLOW DIRECTION: PERSON-ABSENT AREA
S113
UP-AND-DOWN AIRFLOW DIRECTION: FIX TO UPPER SIDE
RIGHT-AND-LEFT AIRFLOW DIRECTION: SWING
S109
k = d?
NO
YES

FIG. 20

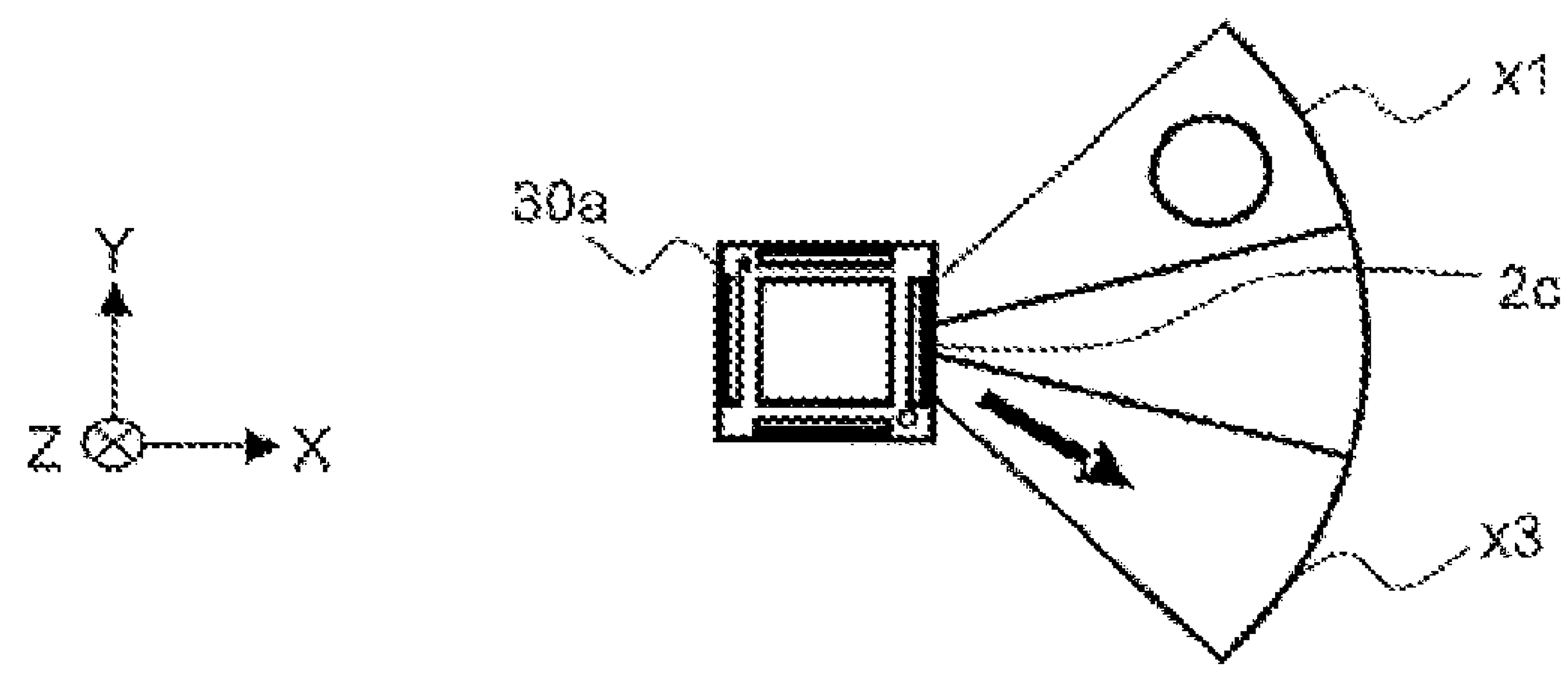


FIG. 21

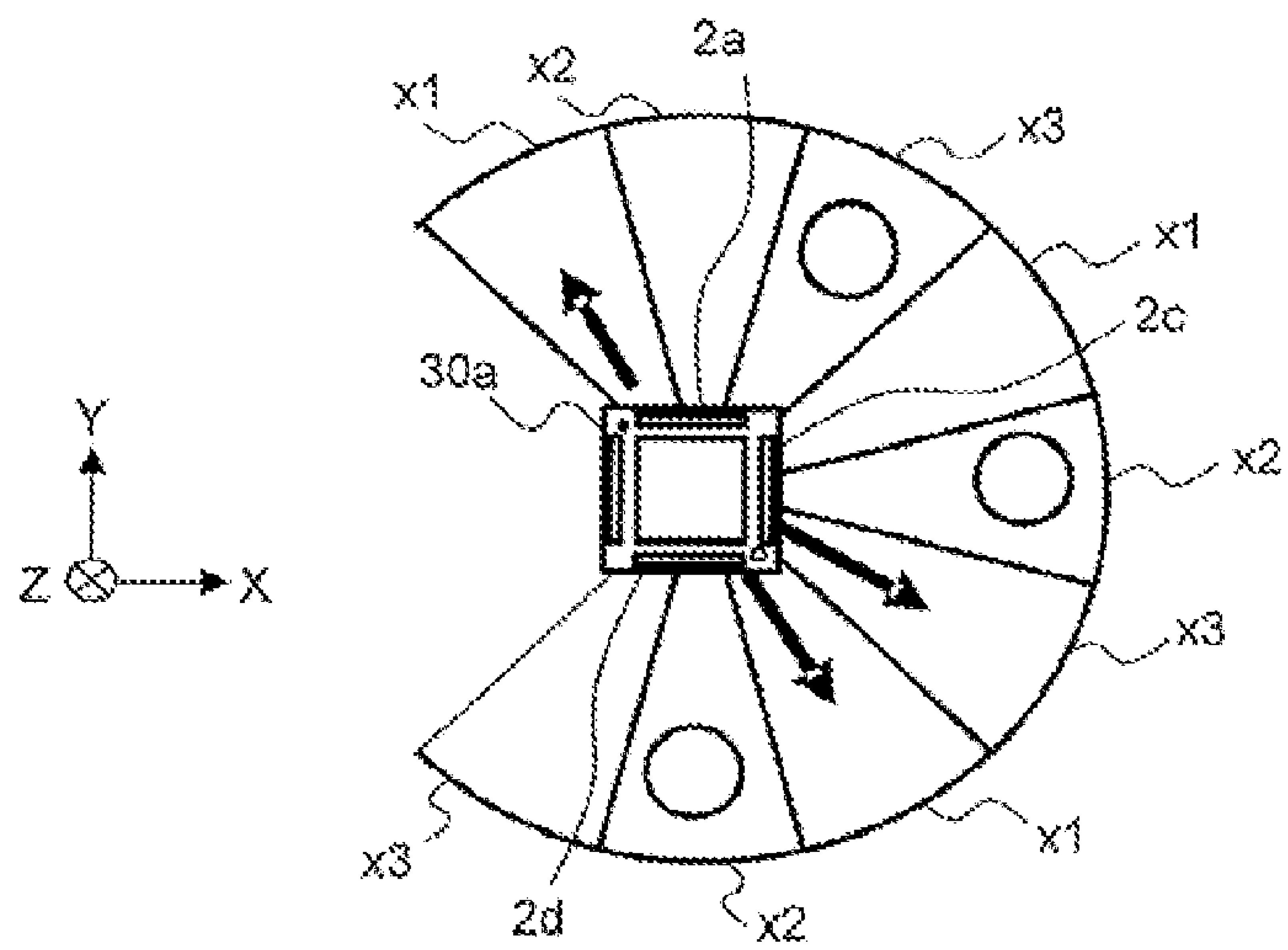


FIG. 22

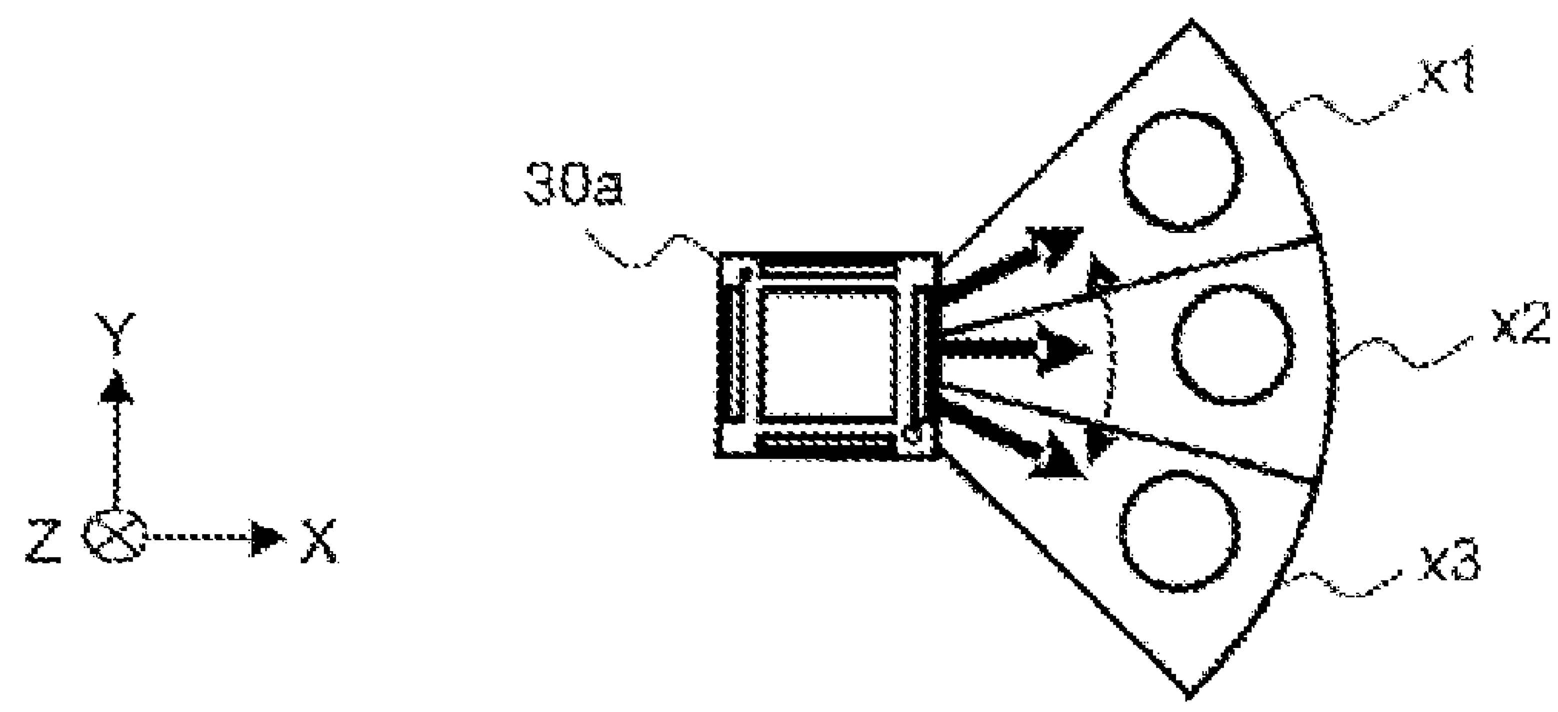


FIG. 23

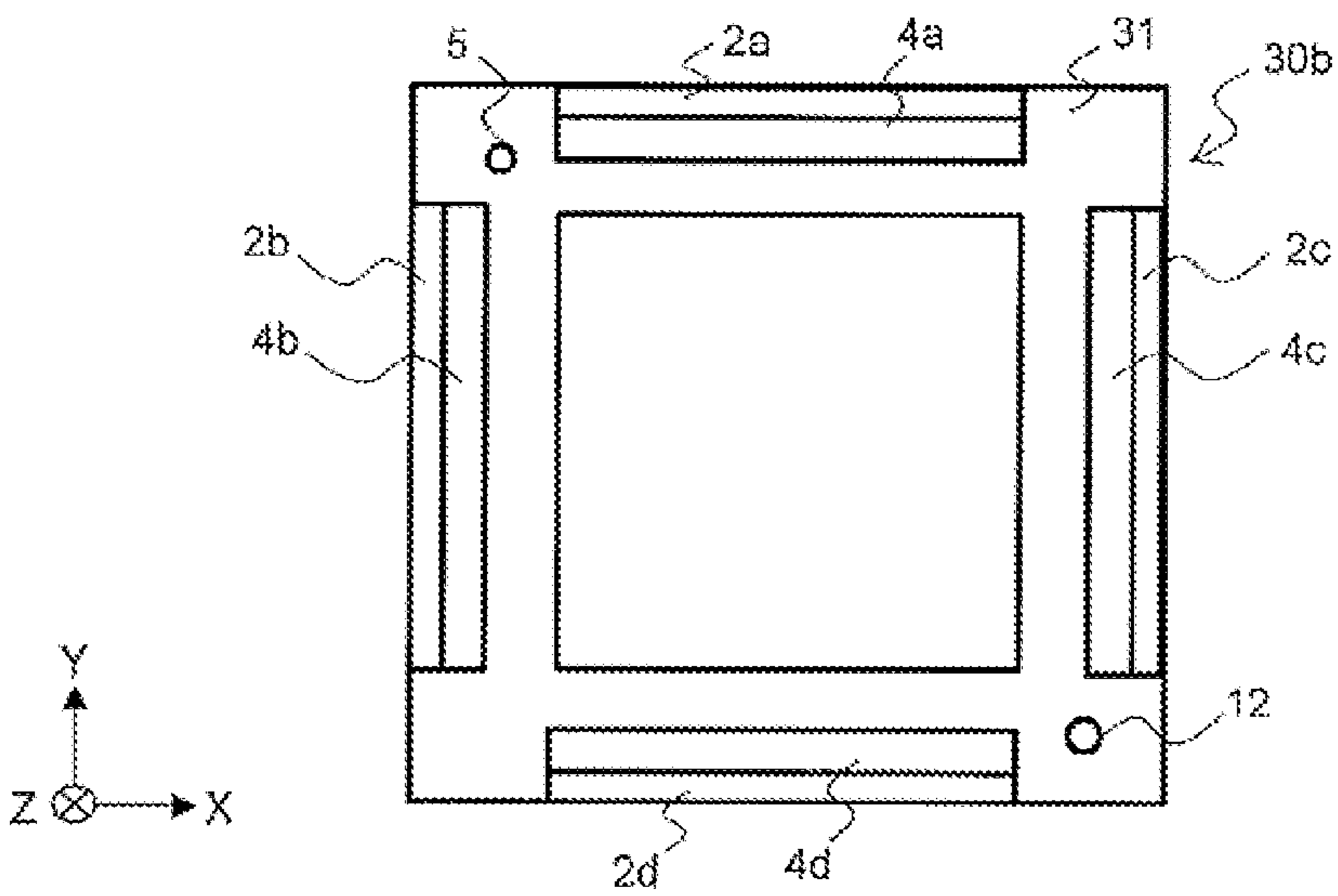


FIG. 24

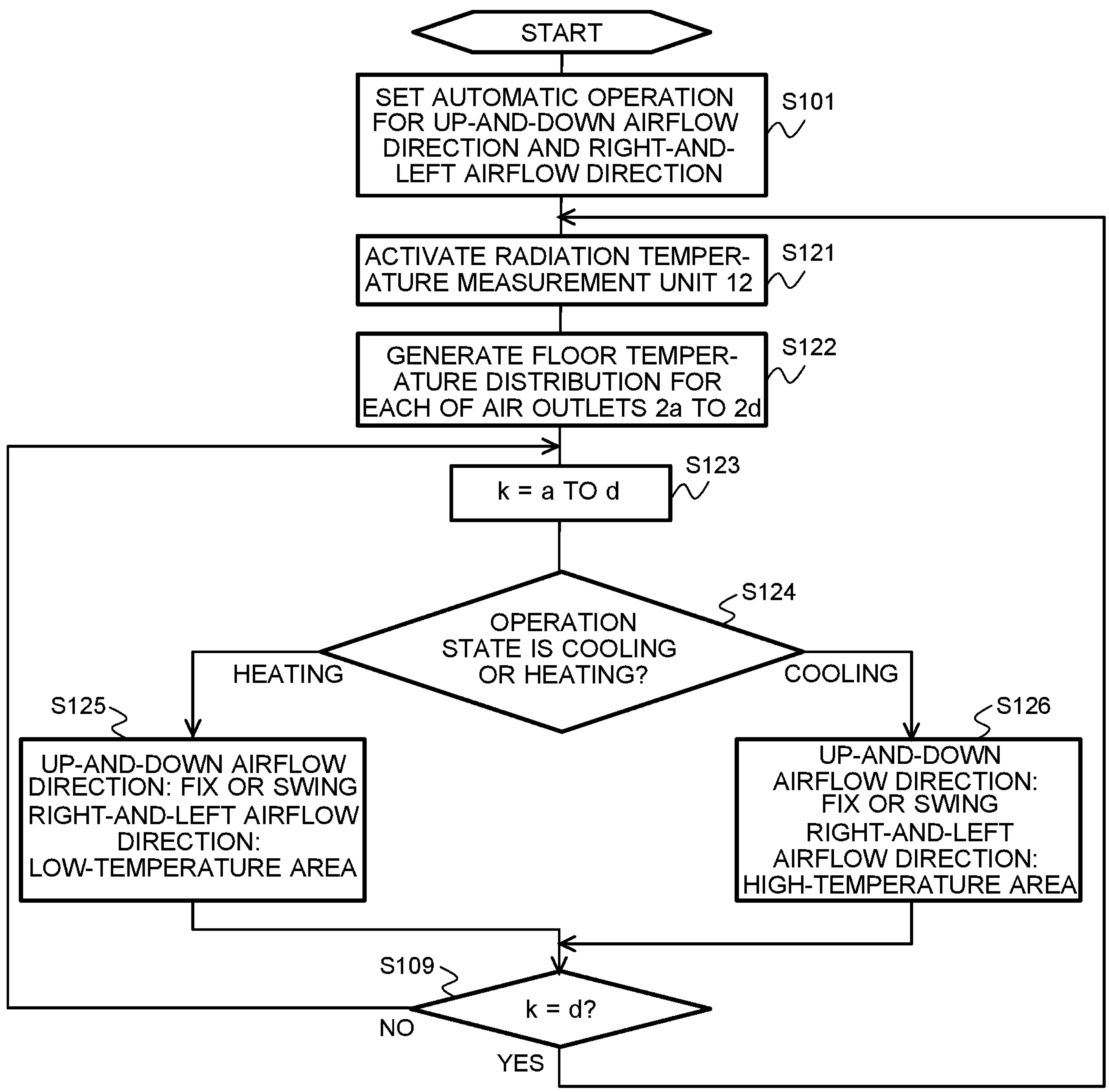

START
SET AUTOMATIC OPERATION FOR UP-AND-DOWN AIRFLOW DIRECTION AND RIGHT-AND-LEFT AIRFLOW DIRECTION
S101
ACTIVATE RADIATION TEMPERATURE MEASUREMENT UNIT 12
S121
GENERATE FLOOR TEMPERATURE DISTRIBUTION FOR EACH OF AIR OUTLETS 2a TO 2d
S122
k = a TO d
S123
OPERATION STATE IS COOLING OR HEATING?
S124
HEATING
COOLING
S125
UP-AND-DOWN AIRFLOW DIRECTION: FIX OR SWING RIGHT-AND-LEFT AIRFLOW DIRECTION: LOW-TEMPERATURE AREA
S126
UP-AND-DOWN AIRFLOW DIRECTION: FIX OR SWING RIGHT-AND-LEFT AIRFLOW DIRECTION: HIGH-TEMPERATURE AREA
S109
k = d?
NO
YES

FIG. 25

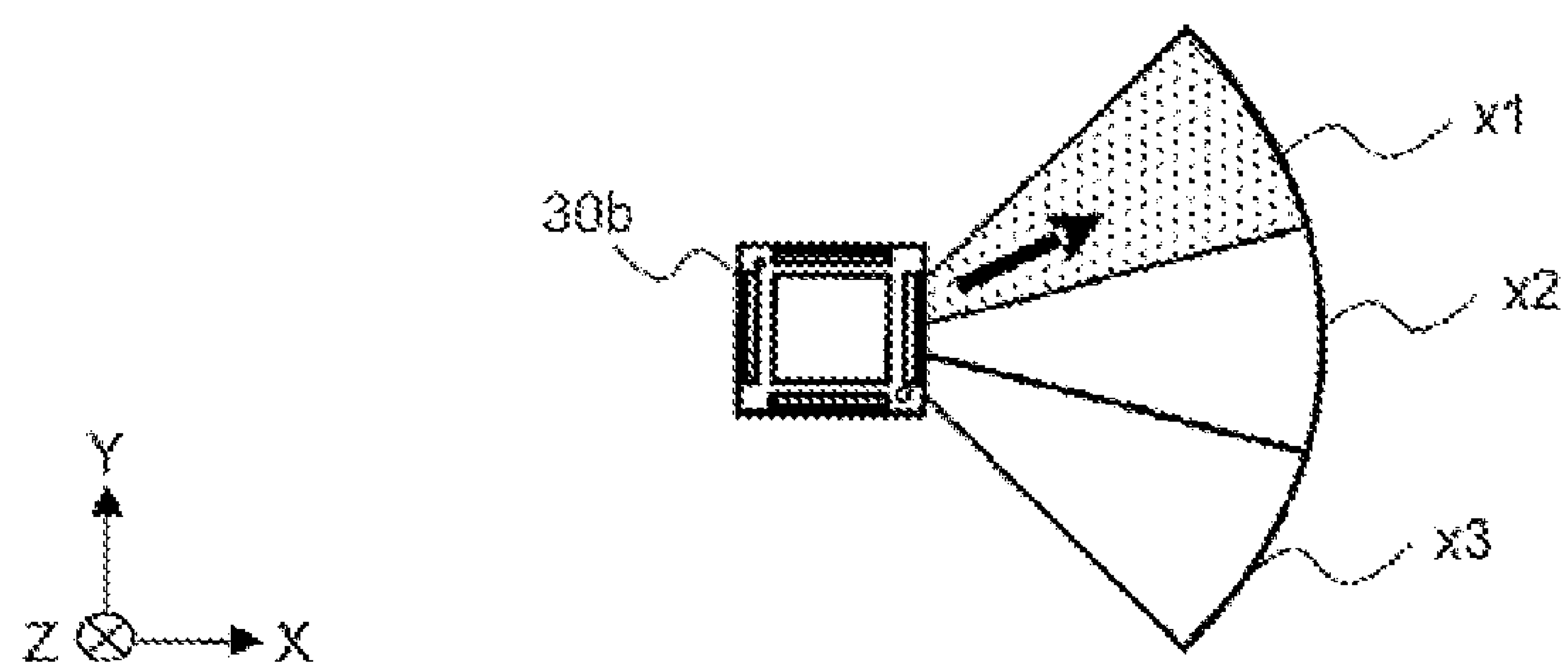
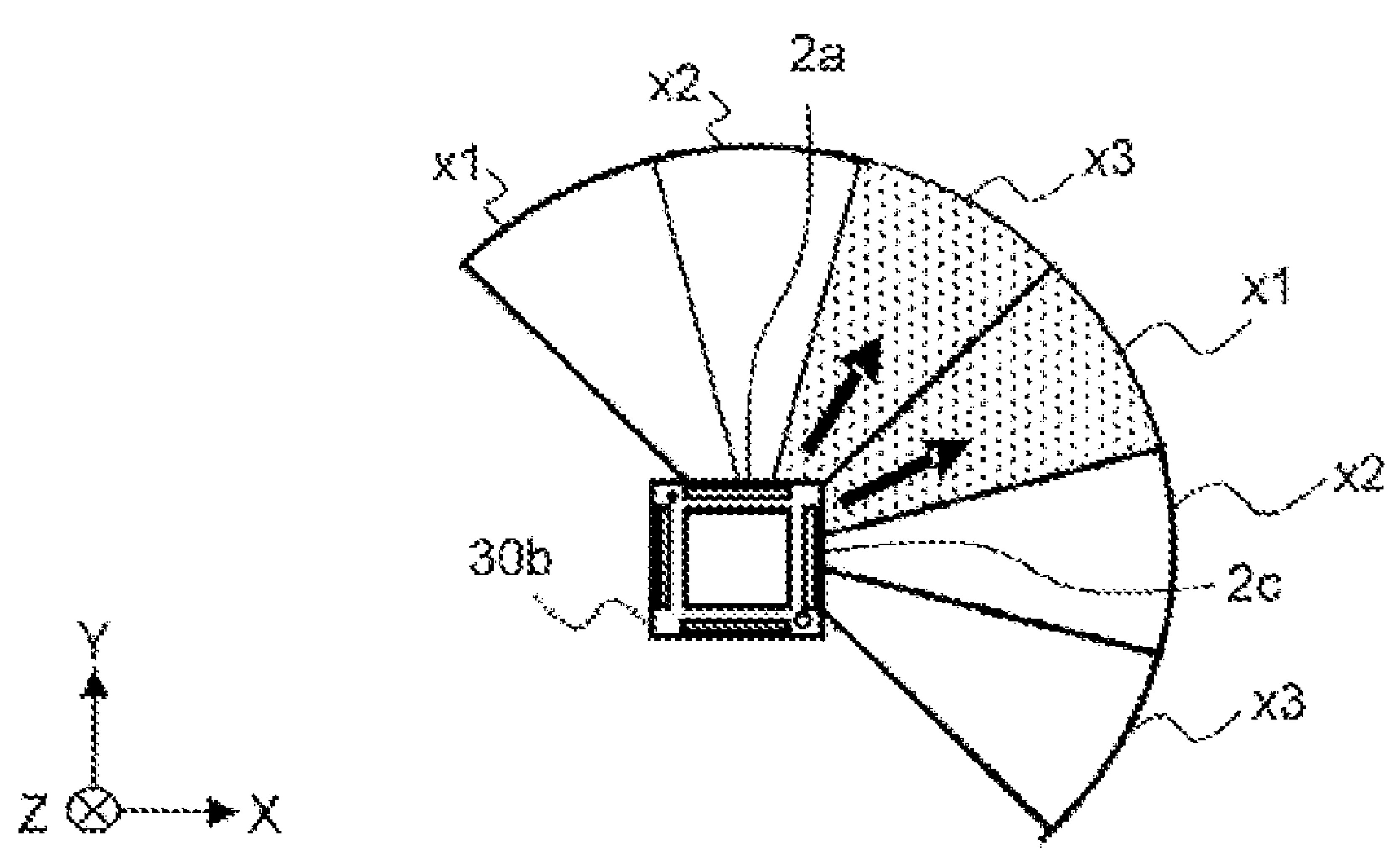


FIG. 26



INDOOR UNIT FOR AIR-CONDITIONING APPARATUS

CROSS REFERENCE TO RELATED APPLICATION

This application is a U.S. national stage application of PCT/JP2017/022081 filed on Jun. 15, 2017, the contents of which are incorporated herein by reference.

TECHNICAL FIELD

The present invention relates to an indoor unit for an air-conditioning apparatus having a configuration for changing a blowing direction of air to be directed to an air-conditioning target space.

BACKGROUND ART

As a related-art indoor unit for an air-conditioning apparatus, there has been known an indoor unit having an air inlet formed at a center portion on a lower surface side of a casing and four air outlets formed to surround four sides of the air inlet, and configured to send air having been subjected to heat exchange to an indoor space through the four air outlets (see Patent Literature 1). The air-conditioning apparatus disclosed in Patent Literature 1 includes an infrared sensor configured to detect a temperature of an object and a first flap and a second flap which are provided to each of the four air outlets. The first flap is configured to change a right-and-left direction of the air which blows out through the air outlet. The second flap is configured to change a vertical direction of the air which blows out through the air outlet.

The air-conditioning apparatus disclosed in Patent Literature 1 has air-conditioning modes including a temperature equalization mode of equalizing a temperature in an air-conditioning target space and a spot air-conditioning mode of intensively air-conditioning a periphery of a human body which is present in the air-conditioning target space. This air-conditioning apparatus selects any one of the spot air-conditioning mode and the temperature equalization mode on the basis of measurement information acquired through measurement by the infrared sensor, and operation information.

The temperature equalization mode is an operation mode of equalizing a temperature in an entire space of the air-conditioning target space. The temperature equalization mode causes the first flap and the second flap at each air outlet to be set to “swing” to equalize the temperature in the air-conditioning target space, thereby being capable of achieving a comfortable air-conditioning state.

The spot air-conditioning mode is an air-conditioning mode of intensively air-conditioning a periphery of a person who is present in the air-conditioning target space and avoiding needless air-conditioning of a portion at which a person is not present. In the spot air-conditioning mode, for the air-conditioning target space which is divided into a plurality of areas, the number of people who are present in each area is calculated, and the first flaps and the second flaps are controlled depending on the calculated number, thereby improving energy-saving performance.

CITATION LIST

Patent Literature

Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2003-194389

SUMMARY OF INVENTION

Technical Problem

In the air-conditioning apparatus disclosed in Patent Literature 1, when the same number of people are present in each area of the plurality of areas of the air-conditioning target space, the temperature equalization mode is set. In the temperature equalization mode, the air-conditioning apparatus causes the first flaps to swing in the right-and-left direction and causes the second flaps to swing in an up-and-down direction.

In the air-conditioning apparatus disclosed in Patent Literature 1, when timings of swings of each of the first flaps and a corresponding one of the second flaps do not match, airflow rates may differ among the areas. As a result, there are formed an area having a high airflow rate and an area having a low airflow rate, with the result that unevenness in temperature may occur. There has been a demand for achieving a finely air-conditioned space requested by a user regardless of a position of the user in the air-conditioning target space.

The present invention has been made to solve the above-mentioned problem, and has an object to provide an indoor unit for an air-conditioning apparatus capable of reducing temperature unevenness in the air-conditioning target space and improving comfortability of a user.

Solution to Problem

According to one embodiment of the present invention, there is provided an indoor unit for an air-conditioning apparatus, including an air-sending unit configured to send air subjected to heat exchange with refrigerant to an air-conditioning target space through an air outlet, the air-conditioning target space being divided into a plurality of areas, an up-and-down airflow direction adjuster provided at the air outlet, and configured to adjust an angle in an up-and-down direction of a blowing direction of the air sent through the air outlet, a right-and-left airflow direction adjuster provided at the air outlet, and configured to adjust an angle in a right-and-left direction of the blowing direction of the air sent through the air outlet, and a controller configured to control the angle of the up-and-down airflow direction adjuster and the angle of the right-and-left airflow direction adjuster. The controller is configured to control the up-and-down airflow direction adjuster and the right-and-left airflow direction adjuster to continuously change the angle in the up-and-down direction and the angle in the right-and-left direction such that the blowing direction of the air is switched to areas of the plurality of areas.

Advantageous Effects of Invention

According to one embodiment of the present invention, to the air-conditioning target space which is divided into the plurality of areas, the indoor unit continuously changes the up-and-down airflow direction and the right-and-left airflow direction to switch the blowing direction of the air to areas of the plurality of areas, thereby being capable of equally air-conditioning the air-conditioning target space. As a result, the temperature unevenness in the air-conditioning target space is reduced, thereby improving comfortability of a user.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is an outer appearance perspective view for illustrating a configuration example of an indoor unit for an air-conditioning apparatus according to Embodiment 1 of the present invention.

FIG. **2** is a plan view of the indoor unit illustrated in FIG. **1** as seen from a lower surface side.

FIG. **3** is a schematic sectional view of the indoor unit taken along broken line A-A illustrated in FIG. **2**.

FIG. **4** is a refrigerant circuit diagram for illustrating a configuration example of the air-conditioning apparatus in Embodiment 1 of the present invention.

FIG. **5** is a block diagram for illustrating a configuration example of a controller illustrated in FIG. **4**.

FIG. **6** is a perspective view for illustrating a configuration example of an up-and-down airflow direction adjuster illustrated in FIG. **1**.

FIG. **7** is an illustration of an example of a case in which an angle of an airflow direction is changed by the up-and-down airflow direction adjuster illustrated in FIG. **6**.

FIG. **8** is a perspective view for illustrating a configuration example of a right-and-left airflow direction adjuster illustrated in FIG. **3**.

FIG. **9** is an illustration of an example of a case in which an angle of the airflow direction is changed by the right-and-left airflow direction adjuster illustrated in FIG. **8**.

FIG. **10** is an explanatory view for illustrating an airflow direction control method which is performed by the indoor unit for an air-conditioning apparatus according to Embodiment 1 of the present invention.

FIG. **11** is an illustration of a procedure of the airflow direction control illustrated in FIG. **10**.

FIG. **12** is an illustration of a procedure of airflow direction control performed by an indoor unit for an air-conditioning apparatus according to Embodiment 2 of the present invention.

FIG. **13** is a plan view of an indoor unit for an air-conditioning apparatus according to Embodiment 3 of the present invention as seen from a lower surface side.

FIG. **14** is a schematic view for illustrating an example of a case in which, in the air-conditioning apparatus in Embodiment 3 of the present invention, an air-conditioning target space is divided into a plurality of areas.

FIG. **15** is a flowchart for illustrating a procedure of airflow direction control performed by the indoor unit for an air-conditioning apparatus according to Embodiment 3 of the present invention.

FIG. **16** is an illustration of a case in which one person-present area is present among the plurality of areas in Embodiment 3 of the present invention.

FIG. **17** is an illustration of a case in which two person-present areas are present among the plurality of areas in Embodiment 3 of the present invention.

FIG. **18** is an illustration of a case in which a person-absent area is sandwiched between two person-present areas in Embodiment 3 of the present invention.

FIG. **19** is a flowchart for illustrating a procedure of airflow direction control performed by an indoor unit for an air-conditioning apparatus according to Embodiment 4 of the present invention.

FIG. **20** is an illustration of a case in which one person-present area is present among a plurality of areas in Embodiment 4 of the present invention.

FIG. **21** is a collective illustration of presence or absence of person-present areas among a plurality of areas for each of three air outlets in Embodiment 4 of the present invention.

FIG. **22** is an illustration of a case in which no person-absent area is present among the plurality of areas in Embodiment 4 of the present invention.

FIG. **23** is a plan view of an indoor unit for an air-conditioning apparatus according to Embodiment 5 of the present invention as seen from a lower surface side.

FIG. **24** is a flowchart for illustrating a procedure of airflow direction control performed by the indoor unit for an air-conditioning apparatus according to Embodiment 5 of the present invention.

FIG. **25** is an illustration of an example of a case in which an area having a floor temperature lower than floor temperatures in other areas among a plurality of areas is present in Embodiment 5 of the present invention.

FIG. **26** is an illustration of an example of a case in which areas having floor temperatures higher than floor temperatures in other areas among the plurality of areas are present in Embodiment 5 of the present invention.

DESCRIPTION OF EMBODIMENTS

Embodiment 1

Description is made of a configuration of an air-conditioning apparatus in Embodiment 1 of the present invention. FIG. **1** is an outer appearance perspective view for illustrating a configuration example of an indoor unit for an air-conditioning apparatus according to Embodiment 1 of the present invention. FIG. **2** is a plan view of the indoor unit illustrated in FIG. **1** as seen from a lower surface side. FIG. **3** is a schematic sectional view of the indoor unit taken along broken line A-A illustrated in FIG. **2**.

In Embodiment 1, an indoor unit **30** illustrated in FIG. **1** is a four-direction ceiling cassette type indoor unit. The indoor unit **30** includes a casing having a rectangular parallelepiped shape. The indoor unit **30** is embedded in a ceiling of a room which is an air-conditioning target space. As illustrated in FIG. **2**, a lower surface **31** of the indoor unit **30** has a rectangular shape, and is exposed to an indoor space side from the ceiling. An air inlet **3** having a rectangular shape is formed at a center in the lower surface **31** of the indoor unit **30**. A latticed frame is provided to the air inlet **3**, but illustration of the frame is omitted in the figures. Along four sides in an outer periphery of the air inlet **3**, there are formed four air outlets **2***a* to **2***d* on an outer side of the air inlet **3**.

As illustrated in FIG. **1**, up-and-down airflow direction adjusters **4***a* to **4***d* are provided to the air outlets **2***a* to **2***d*, respectively. The up-and-down airflow direction adjusters **4***a* to **4***d* adjust angles of air sent to the indoor space through the air outlets **2***a* to **2***d* in an up-and-down direction. Further, a right-and-left airflow direction adjuster **6** illustrated in FIG. **3** is provided to each one of the air outlets **2***a* to **2***d*. The right-and-left airflow direction adjusters **6** adjust angles of air sent to the indoor space through the air outlets **2***a* to **2***d* in a right-and-left direction. Further, as illustrated in FIG. **1** and FIG. **2**, a temperature measurement unit **5** configured to measure a temperature of air in the indoor space is provided to the lower surface **31** of the indoor unit **30**.

In Embodiment 1, the right-and-left direction corresponds to a direction horizontal to the air-conditioning target space, with each of the air outlets **2***a* to **2***d* as a reference. Further, the up-and-down direction corresponds to a direction perpendicular to the horizontal direction, with each of the air outlets **2***a* to **2***d* as a reference.

As illustrated in FIG. **3**, the indoor unit **30** includes an upper casing **32***a* and a lower casing **32***b*. The indoor unit **30** can be separated into the upper casing **32***a* and the lower casing **32***b*. In the upper casing **32***a*, there are provided an air-sending unit **8** and a load-side heat exchanger **7**. In the lower casing **32***b*, there are provided the air inlet **3**, the air outlets **2***a* to **2***d*, the right-and-left airflow direction adjusters **6**, and the up-and-down airflow direction adjusters **4***a* to **4***d*. A humidity measurement unit **10** is provided to the air inlet **3** of the lower casing **32***b*. The humidity measurement unit **10** is configured to measure a humidity of air sucked from the indoor space through the air inlet **3**. Arrows illustrated in FIG. **3** each indicate a flow of air. When the air-sending unit **8** is rotated, air is sucked into the indoor unit **30** through the air inlet **3**. The air having been sucked into the indoor unit **30** is subjected to heat exchange with refrigerant flowing through the load-side heat exchanger **7**, and then returns to the indoor space through the air outlets **2***a* to **2***d*.

FIG. **4** is a refrigerant circuit diagram for illustrating a configuration example of the air-conditioning apparatus in Embodiment 1 of the present invention. As illustrated in FIG. **4**, an air-conditioning apparatus **1** includes an outdoor unit **20** and the indoor unit **30** illustrated in FIG. **1** to FIG. **3**. The outdoor unit **20** includes a compressor **21**, a four-way valve **22**, a heat source-side heat exchanger **23**, and an expansion valve **24**. The indoor unit **30** includes a controller **33** illustrated in FIG. **4**, in addition to the load-side heat exchanger **7** and the air-sending unit **8** illustrated in FIG. **3**. A refrigerant circuit **25** has a configuration in which the compressor **21**, the four-way valve **22**, the heat source-side heat exchanger **23**, the expansion valve **24**, and the load-side heat exchanger **7** are connected to one another by refrigerant pipes.

FIG. **5** is a block diagram for illustrating a configuration example of the controller illustrated in FIG. **4**. The controller **33** includes a memory **35** and a central processing unit (CPU) **36**. The memory **35** is configured to store a program. The CPU **36** is configured to execute processing in accordance with the program. The controller **33** is connected to the temperature measurement unit **5**, the humidity measurement unit **10**, the air-sending unit **8**, the compressor **21**, the four-way valve **22**, and the expansion valve **24** by signal lines. The controller **33** is connected to a drive unit **37** configured to drive the up-and-down airflow direction adjusters **4***a* to **4***d* by signal lines. Further, the controller **33** is connected to a drive unit **38** configured to drive the plurality of right-and-left airflow direction adjusters **6** by signal lines. In FIG. **1** to FIG. **4**, illustration of the drive units **37** and **38** is omitted.

Description is made below of configurations of the up-and-down airflow direction adjusters **4***a* to **4***d* and the right-and-left airflow direction adjusters **6**. FIG. **6** is a perspective view for illustrating a configuration example of the up-and-down airflow direction adjuster illustrated in FIG. **1**. FIG. **7** is an illustration of an example of a case in which an angle of the airflow direction is changed by the up-and-down airflow direction adjuster illustrated in FIG. **6**. In FIG. **6** and FIG. **7**, for ease of description, the configuration is schematically illustrated. The up-and-down airflow direction adjusters **4***a* to **4***d* each have the same configuration, and hence description is made with the up-and-down airflow direction adjuster **4***a*.

As illustrated in FIG. **6**, the up-and-down airflow direction adjuster **4***a* includes an up-and-down vane **41** and a shaft portion **42**. As illustrated in FIG. **6**, the up-and-down vane **41** is a plate-like part having a rectangular shape. A longitudinal length of the up-and-down vane **41** is equal to a longitudinal length of the air outlet **2***a* illustrated in FIG. **1**. The shaft portion **42** is mounted to the up-and-down vane **41** in parallel at an edge of the up-and-down vane **41** on an edge side opposite to an edge side facing the indoor space. The shaft portion **42** is connected to the drive unit **37**. When the controller **33** controls the drive unit **37** to rotate the shaft portion **42**, a distal end of the up-and-down vane **41** swings in the up-and-down direction.

FIG. **7** is an illustration of a case in which a room which is the air-conditioning target space is seen from a lateral side. The controller **33** controls the drive unit **37** to set the distal end of the up-and-down vane **41** to any one position among a plurality of positions in the up-and-down direction. In Embodiment 1, the plurality of positions are three positions including an upper side **45**, a lower side **47**, and a middle **46**. The middle **46** is a position between the upper side **45** and the lower side **47**. Further, in FIG. **7**, a state in which the air-conditioning target space is imaginarily divided into three areas including area **y1** to area **y3** is illustrated with broken lines. FIG. **7** is an illustration of a case in which, with the air outlet **2***a* serving as a reference, the area **y1**, the area **y2**, and the area **y3** are sequentially allocated in a direction in which a distance from the air outlet **2***a* increases (Y-axis direction illustrated in FIG. **7**). The number of areas into which the air-conditioning target space is divided in the Y-axis direction of the figure, is not limited to three.

In FIG. **7**, when the up-and-down vane **41** is at the position of the upper side **45**, air which flows into the indoor space through the air outlet **2***a* mainly flows along an arrow **51** illustrated in FIG. **7**. In this case, the air mainly flows into the area **y1** through the air outlet **2***a*. Further, when the up-and-down vane **41** is at the position of the middle **46**, the air which flows into the indoor space through the air outlet **2***a* mainly flows along an arrow **52** illustrated in FIG. **7**. In this case, the air mainly flows into the area **y2** through the air outlet **2***a*. When the up-and-down vane **41** is at the position of the middle **46**, the air which flows into the indoor space through the air outlet **2***a* mainly flows along an arrow **53** illustrated in FIG. **7**. In this case, the air mainly flows into the area **y1** through the air outlet **2***a*. In such a manner, the controller **33** can set the blowing direction of the air per area, for example, the area **y1**, the area **y2**, and the area **y3**.

In the foregoing, description is made of the case in which one up-and-down vane **41** is provided. However, a plurality of up-and-down vanes **41** may be provided in parallel in the longitudinal direction of the up-and-down vane **41**. In this case, intensity of air which flows into each area can be increased. Specific description is made of this feature. When the controller **33** sets the blowing direction of the air to be directed to the area **y2**, one up-and-down vane **41** of two up-and-down vanes **41** is set to the position of the middle **46**. Then, the controller **33** sets an other up-and-down vane **41** to a position of preventing the air which flows out through the air outlet **2***a* from flowing to the area **y1**. With this configuration, the intensity of the air which flows into the area **y2** through the air outlet **2***a* is increased.

FIG. **8** is a perspective view for illustrating a configuration example of the right-and-left airflow direction adjuster illustrated in FIG. **3**. FIG. **9** is an illustration of an example of a case in which an angle of the airflow direction is changed by the right-and-left airflow direction adjuster illustrated in FIG. **8**. In FIG. **8** and FIG. **9**, for ease of description, the configuration is schematically illustrated. The right-and-left airflow direction adjusters **6** provided to the respective air outlets **2***a* to **2***d* each have the same configuration, and hence description is made below with the right-and-left airflow direction adjuster **6** provided to the air outlet **2***a*.

As illustrated in FIG. **8**, the right-and-left airflow direction adjuster **6** includes right-and-left vanes **61***a* and **61***b* and a shaft portion **63**. The right-and-left vanes **61***a* and **61***b* are each connected by a hinge **62** to a casing (not shown) in the indoor unit **30** illustrated in FIG. **1**. As illustrated in FIG. **8**, the right-and-left vanes **61***a* and **61***b* are each a plate-like part having a rectangular shape. The shaft portion **63** is mounted to an upper portion of a distal end of each of the right-and-left vanes **61***a* and **61***b* on a distal end side opposite to a distal end side facing the indoor space. The shaft portion **63** is connected to the drive unit **38**. The right-and-left vanes **61***a* and **61***b* are connected to each other by the shaft portion **63**. Thus, the right-and-left vanes **61***a* and **61***b* operate in association with each other as the shaft portion **63** moves. The controller **33** controls the drive unit **38** to cause the shaft portion **63** to swing in the right-and-left direction, to thereby cause the distal ends of the right-and-left vanes **61***a* and **61***b* to swing in the right-and-left direction. FIG. **8** is an illustration of the case in which two right-and-left vanes are provided. However, the number of right-and-left vanes may be three or more.

FIG. **9** is a schematic illustration of a state in which the air-conditioning target space is seen from the right-and-left airflow direction adjusters illustrated in FIG. **8**. In FIG. **9**, a state in which the air-conditioning target space is imaginarily divided into four areas including area x**1**, area x**2**-**1**, area x**2**-**2**, and area x**3** in the horizontal direction, with the air outlet **2***a* serving as a reference, is illustrated with broken lines. Description is made below with the case in which the air-conditioning target space is divided into four areas, but the air-conditioning target space may be divided into three areas including area x**1**, area x**2**, and area x**3**. The number of areas into which the air-conditioning target space is divided in the horizontal direction is not limited to three or four.

The controller **33** controls the drive unit **38** to set the distal ends of the right-and-left vanes **61***a* and **61***b* to any one position among a plurality of positions in the right-and-left direction. In Embodiment 1, the plurality of positions are four positions. With reference to FIG. **9**, description is made below of the cases of two positions including a left side position and a right side position among the four positions, and description of two middle positions between the left side position and the right side position is omitted.

In FIG. **9**, the case in which the right-and-left vanes **61***a* and **61***b* are each at the left side position is illustrated with the solid lines. When the right-and-left vanes **61***a* and **61***b* each are at the left side position, air which flows into the indoor space through the air outlet **2***a* flows along an arrow illustrated with the solid line. In this case, the air mainly flows into the area x**1** through the air outlet **2***a*. Further, in FIG. **9**, the case in which the right-and-left vanes **61***a* and **61***b* are each at the right side position is illustrated with broken lines. When the right-and-left vanes **61***a* and **61***b* are each at the right side position, air which flows into the indoor space through the air outlet **2***a* flows along an arrow illustrated with the broken line. In this case, the air mainly flows into the area x**3** through the air outlet **2***a*. In such a manner, the controller **33** can set the blowing direction of the air per area, for example, the area x**1**, the area x**2**-**1**, the area x**2**-**2**, and the area x**3**.

Next, with reference to FIG. **5**, description is made of contents of control performed by the controller **33**. The controller **33** controls a refrigeration cycle in which refrigerant circulates through the refrigerant circuit **25**. The controller **33** controls flow paths of the four-way valve **22** in accordance with an operation state of the air-conditioning apparatus **1**. Specifically, when the air-conditioning apparatus **1** performs a cooling operation, the controller **33** controls the flow paths of the four-way valve **22** to cause refrigerant discharged from the compressor **21** to flow into the heat source-side heat exchanger **23** and cause refrigerant flowing out from the load-side heat exchanger **7** to return to an intake port side of the compressor **21**. When the air-conditioning apparatus **1** performs a heating operation, the controller **33** controls the flow paths of the four-way valve **22** to cause refrigerant discharged from the compressor **21** to flow into the load-side heat exchanger **7** and cause refrigerant flowing out from the heat source-side heat exchanger **23** to return to the intake port side of the compressor **21**.

The controller **33** controls an operation frequency of the compressor **21** and an opening degree of the expansion valve **24** so that a measurement value acquired from the temperature measurement unit **5** falls within a range determined for a set temperature. The controller **33** controls the operation frequency of the compressor **21** and the opening degree of the expansion valve **24** so that a measurement value acquired from the humidity measurement unit **10** falls within a range determined for a set humidity.

Further, the controller **33** controls angles of airflow directions of the up-and-down airflow direction adjusters **4***a* to **4***d* and the plurality of right-and-left airflow direction adjusters **6**. The memory **35** of the controller **33** stores an area map representing a map of the plurality of areas obtained by imaginarily dividing the air-conditioning target space for each of the air outlets **2***a* to **2***d*. An example of the area map is a combination of the area y**1** to the area y**3** illustrated in FIG. **7** and the area x**1** to the area x**3** illustrated in FIG. **9**. When an automatic operation is set for the up-and-down airflow direction and the right-and-left airflow direction, the controller **33** controls the up-and-down airflow direction adjusters **4***a* to **4***d* and the plurality of right-and-left airflow direction adjusters **6** to continuously change the angles in the up-and-down direction and the right-and-left direction so that the blowing directions of air are switched per area.

Description has been made of the case in which the controller **33** is provided to the indoor unit **30** with reference to FIG. **1** to FIG. **5**. However, the controller **33** may be provided to the outdoor unit **20**. Description has been made of the case in which the expansion valve **24** is provided to the outdoor unit **20**. However, the expansion valve **24** may be provided to the indoor unit **30**. Further, in Embodiment 1, description is made of the case in which the controller **33** performs the airflow direction control for the four air outlets **2***a* to **2***d*, but one air outlet may be subjected to the airflow direction control.

Next, description is made of operations of the air-conditioning apparatus **1** in Embodiment 1. For ease of description, description is made below of the case of the air-conditioning target space facing the air outlet **2***a*. FIG. **10** is an explanatory view for illustrating an airflow direction control method which is performed by the indoor unit for an air-conditioning apparatus according to Embodiment 1 of the present invention.

As illustrated in FIG. **10**, the air-conditioning target space is divided into twelve areas including a combination of the area y**1** to the area y**3** illustrated in FIG. **7** and the area x**1** to the area x**3** illustrated in FIG. **9**. FIG. **10** is an illustration of an example of the area map of the air-conditioning target space of the air outlet **2***a*. The twelve areas illustrated in FIG. **10** are formed to be divided in a direction in which a distance from the air outlet **2***a* serving as a reference increases and in a direction horizontal to the air outlet **2***a* serving as a reference. Coordinates of the areas illustrated in FIG. **10** are each indicated in a form of (x, y) which is a combination of the area name illustrated in FIG. **9** and the area name illustrated in FIG. **7**. Specifically, when the up-and-down vane **41** is at the upper side **45**, and the right-and-left vanes **61***a* and **61***b* are each at the left side, a coordinate of an area in the blowing direction of the air is (x**1**, y**3**).

The memory **35** of the controller **33** stores, for each of the air outlets **2***a* to **2***d*, coordinates of the areas illustrated in FIG. **10** and control contents for the up-and-down airflow direction adjuster **4***a* and the right-and-left airflow direction adjuster **6**. The control contents correspond to information of an angle of the up-and-down vane **41** and an angle of the right-and-left vanes **61***a* and **61***b*. When the automatic operation is set for the up-and-down airflow direction and the right-and-left airflow direction, the controller **33** controls the up-and-down airflow direction adjuster **4***a* and the right-and-left airflow direction adjuster **6** in association with each other so that the blowing direction of the air is switched to areas of the plurality of areas illustrated in FIG. **10**. As an example of a method of setting the automatic operation, there is given a method of allowing a user to operate a remote controller (not shown) to input an instruction of the automatic operation to the controller **33**. In the following, the operation of switching the blowing direction of the air per area is referred to as "swing operation".

Arrows illustrated in FIG. **10** represent an example of switching of an airflow direction in Embodiment 1. FIG. **11** is an illustration of a procedure of the airflow direction control illustrated in FIG. **10**. The upper stage in FIG. **11** is an illustration of an order of positions of the up-and-down vane **41** of the up-and-down airflow direction adjuster, and the lower stage in FIG. **11** is an illustration of an order of positions of the right-and-left vanes **61***a* and **61***b* of the right-and-left airflow direction adjuster. In the upper stage in FIG. **11**, positions of the up-and-down vane **41** are denoted by "U" indicating the upper side **45**, "D" indicating the lower side **47**, and "M" indicating the middle **46**. In the lower stage in FIG. **11**, positions of the right-and-left vanes **61***a* and **61***b* are denoted by "L" indicating the left side and "R" indicating the right side. When the right-and-left vanes **61***a* and **61***b* are at the middle, in the lower stage in FIG. **11**, the area x**2**-**1** and the area x**2**-**2** in the blowing direction are integrated, and the integrated positions are each denoted by "M".

When the controller **33** performs a series of control in accordance with the procedure illustrated in FIG. **11** to cause the up-and-down airflow direction adjuster **4***a* and the right-and-left airflow direction adjuster **6** to synchronously operate in association with each other, the blowing direction of the air is switched in the air-conditioning target space in the order indicated by the arrows illustrated in FIG. **10**. The series of control corresponds to the procedure from the left end to the right end in FIG. **11**. The controller **33** performs the series of control in constant cycles. In one cycle, the blowing direction of the air is switched in the order of arrows **55**, **56**, **57**, and **58** illustrated in FIG. **10**. With reference to FIG. **10**, in one cycle, a trajectory of the blowing direction of the air to the air-conditioning target space is 8-shaped.

The controller **33** continuously changes the angle of the up-and-down airflow direction adjuster **4***a* and the angle of the right-and-left airflow direction adjuster **6** so that the trajectory of the blowing direction of the air to the plurality of areas is 8-shaped. In this case, as the air-conditioning target space, all of the plurality of areas which the air stream generated from one air outlet **2***a* reaches can be covered, and also a time period in which air blows against one area can be shortened. As a result, the air-conditioning target space which is reduced in temperature unevenness can be provided.

In Embodiment 1, description has been made of the case in which the controller **33** performs the above-mentioned airflow direction control when the instruction of the automatic operation is input. However, a trigger for starting the airflow direction control in Embodiment 1 is not limited to the input by a user. For example, in a case in which the operation state of the air-conditioning apparatus **1** is the cooling operation, the controller **33** may start the above-mentioned airflow direction control when the temperature measured by the temperature measurement unit **5** does not fall within the range determined for the set temperature. Further, in the case in which the operation state of the air-conditioning apparatus **1** is the cooling operation, the controller **33** may start the above-mentioned airflow direction control when the humidity measured by the humidity measurement unit **10** does not fall within the range determined for the set humidity.

The indoor unit **30** for the air-conditioning apparatus **1** according to Embodiment 1 controls the up-and-down airflow direction adjuster **4***a* and the right-and-left airflow direction adjuster **6** to continuously change the angle in the up-and-down direction and the angle of the right-and-left direction so that the blowing direction of the air is switched to areas of the plurality of areas of the air-conditioning target space.

According to Embodiment 1, the indoor unit **30** continuously changes the up-and-down airflow direction and the right-and-left airflow direction to the air-conditioning target space divided into the plurality of areas, to thereby switch the blowing direction of the air to areas of the plurality of areas. Consequently, the air-conditioning target space can be evenly air-conditioned. As a result, in the air-conditioning target space, the temperature unevenness is reduced, thereby improving comfortability of a user. The airflow rate becomes more even in the entirety of the air-conditioning target space, thereby reducing the draft feeling giving feeling of discomfort to a user.

In Embodiment 1, when the controller **33** performs the above-mentioned control over the up-and-down airflow direction adjusters **4***a* to **4***d* and the right-and-left airflow direction adjusters **6** at the four air outlets **2***a* to **2***d*, the entire room can be evenly air-conditioned. The temperature unevenness in the entire room is reduced, thereby reducing the draft feeling giving feeling of discomfort to a user anywhere in the room.

In Embodiment 1, there are formed the plurality of areas which are obtained by dividing the air-conditioning target space in the direction in which the distance from the air outlet **2***a* serving as a reference increases and the direction horizontal to the air outlet **2***a*. The air-conditioning target space is divided into the plurality of areas not only in the horizontal direction but also in a distance from the air outlet **2***a*. Consequently, when the controller **33** performs the control of switching the blowing direction of the air per area, finer air-conditioning setting can be achieved.

Embodiment 2

The air-conditioning apparatus in Embodiment 1 causes the up-and-down airflow direction adjusters **4***a* to **4***d* and the plurality of right-and-left airflow direction adjusters **6** to operate in association with each other to eliminate the temperature unevenness in the air-conditioning target space, thereby reducing the draft feeling of a user. The air-conditioning apparatus in Embodiment 2 of the present invention provides the air-conditioning target space which is further reduced in temperature unevenness in the case of the heating operation.

The configuration of the air-conditioning apparatus in Embodiment 2 is the same as the configuration of the air-conditioning apparatus **1** described in Embodiment 1, and hence description of the configuration is omitted in Embodiment 2. During the heating operation, warm air blown out from the indoor unit **30** of the air-conditioning apparatus **1** is liable to stagnate on a ceiling surface, with the result that there is given a state of being hot on a head side and cold on a feet side. As an example of a method for preventing such a state, an operation of the air-conditioning apparatus **1** in Embodiment 2 is described. Description is made below of the operation of the air-conditioning apparatus **1** in the case of the airflow direction control for the air outlet **2***a*.

FIG. **12** is an illustration of a procedure of the airflow direction control performed by the indoor unit for the air-conditioning apparatus according to Embodiment 2 of the present invention. The upper stage in FIG. **12** is an illustration of an order of positions of the up-and-down vane **41** of the up-and-down airflow direction adjuster, and the lower stage in FIG. **12** is an illustration of an order of positions of the right-and-left vanes **61***a* and **61***b* of the right-and-left airflow direction adjuster.

In the order illustrated in the upper stage in FIG. **12**, as indicated by broken line frames, there are regions in which the up-and-down vane **41** is frequently at the position of the lower side **47**. Meanwhile, as illustrated in the lower stage in FIG. **12**, the right-and-left vanes **61***a* and **61***b* perform the swing operation of switching the blowing direction of the air per area to be directed to the plurality of areas divided in the direction horizontal to the air outlet **2***a* serving as a reference. According to comparison of the broken line frames in the upper stage in FIG. **12** and the lower stage in FIG. **12**, when the right-and-left vanes **61***a* and **61** cause the blowing direction of the air to be directed to the area x**2** at the middle M, a position of the up-and-down vane **41** is at the lower side **47**.

As described above with reference to FIG. **12**, when the heating operation is performed, under a state in which the right-and-left airflow direction adjuster **6** is controlled to perform the swing operation, the controller **33** performs control over the up-and-down airflow direction adjuster **4***a* to increase the ratio of time of causing the blowing direction of the air to be directed to the lower side **47**. In the procedure illustrated in FIG. **12**, the controller **33** controls the up-and-down airflow direction adjuster **4***a* so that the blowing direction of the air is directed to the lower side when the right-and-left airflow direction adjuster **6** is positioned at the middle.

The controller **33** performs the control of causing the up-and-down airflow direction to be directed to the lower side when the right-and-left airflow direction is positioned at the middle. With this control, warm air is likely to reach feet of a user who is in the indoor space, thereby being capable of reducing the temperature unevenness in the up-and-down direction in the indoor space. When the air-conditioning apparatus **1** performs the heating operation, the blowing direction of the air is caused to swing in the right-and-left direction, and the ratio of time of causing the up-and-down direction to be directed downward is increased. With this control, stagnation of heat on the ceiling side is prevented, thereby being capable of evenly air-conditioning the entire room. Further, when the controller **33** performs control of causing the airflow rate to be highest when the right-and-left airflow direction is positioned at the middle, improvement in effect of reducing the temperature unevenness in the up-and-down direction in the indoor space can be expected.

In the indoor unit **30** for the air-conditioning apparatus **1** according to Embodiment 2, when the heating operation is performed, in the entire time for switching the blowing direction of the air to be directed to the area y**1** to the area y**3** with the air outlet **2***a* serving as a reference, the ratio of time for the area y**1** is set larger than the ratio of time for the other area y**2** and the other area y**3**.

According to Embodiment 2, when the air-conditioning apparatus **1** performs the heating operation, with regard to the blowing direction of the air, control is performed to increase the ratio toward the lower side in the up-and-down direction and cause the blowing direction of the air to swing in the right-and-left direction, thereby being capable of evenly air-conditioning the air-conditioning target space. As a result, in the air-conditioning target space, the temperature unevenness in the up-and-down direction is addressed, thereby being capable of achieving both comfortability and energy-saving performance. The air-conditioning apparatus **1** performs control similar to the above-mentioned control at the four air outlets **2***a* to **2***d*, thereby being capable of evenly air-conditioning the room. As a result, the temperature unevenness in the up-and-down direction in the indoor space is reduced, thereby being capable of achieving both the comfortability and energy-saving performance.

Embodiment 3

The air-conditioning apparatus in Embodiments 1 and 2 cause the up-and-down airflow direction adjusters **4***a* to **4***d* and the plurality of right-and-left airflow direction adjusters **6** to operate in association with each other to reduce the temperature unevenness in the air-conditioning target space, to thereby improve the comfortability of a user. An air-conditioning apparatus in Embodiment 3 of the present invention includes a human body position detection unit configured to detect a position at which a person is present in the air-conditioning target space, and is configured to perform control of automatically causing the air to be blown against a person. There is difference in sensible temperature depending on a person, and hence Embodiment 3 is suitable for a person who desires air from the air-conditioning apparatus to be blown.

Description is made of a configuration of the air-conditioning apparatus in Embodiment 3. In Embodiment 3, detailed description of the configurations similar to those of Embodiments 1 and 2 is omitted, and features different from those of Embodiments 1 and 2 are described in detail.

FIG. **13** is a plan view of an indoor unit for an air-conditioning apparatus according to Embodiment 3 of the present invention as seen from a lower surface side. FIG. **14** is a schematic view for illustrating an example of a case in which the air-conditioning target space is divided into a plurality of areas with the air-conditioning apparatus in Embodiment 3 of the present invention.

As illustrated in FIG. **13**, a human body position detection unit **11** is provided to a lower surface **31** of an indoor unit **30***a*. In the indoor unit **30***a* illustrated in FIG. **13**, the human body position detection unit **11** is provided at a position diagonal to the temperature measurement unit **5** on the lower surface **31**. The position at which the human body position detection unit **11** is provided is not limited to the position illustrated in FIG. **13**. The controller **33** is connected to the human body position detection unit **11** by a signal line. In Embodiment 3, the human body position detection unit **11** is an infrared sensor.

As illustrated in FIG. **14**, the air-conditioning target space of each of the air outlets **2***a* to **2***d* of the indoor unit **30***a* is divided into nine areas. The broken line frame illustrated in FIG. **14** indicates the nine areas of the air-conditioning target space at the air outlet **2***c*. The entirety of the air-conditioning target space by the indoor unit **30***a* is divided into 9×4=36 areas. The memory **35** of the controller **33** stores the area map illustrated in FIG. **14**.

The human body position detection unit **11** measures a radiation temperature for each position specified by a distance from a reference position and an azimuth angle set for the indoor unit **30***a*. There is an advantage in that the measurement accuracy increases as intervals of the positions specified by the distance from the reference position and the azimuth angle are finer. However, there is a disadvantage in that time required for measurement increases. In Embodiment 1, the human body position detection unit **11** measures radiation temperatures at a plurality of positions for each of the areas illustrated in FIG. **14**. In Embodiment 1, increase in time required for measurement is reduced by setting the measurement region pert area. Further, degradation in measurement accuracy is prevented by performing measurement at a plurality of positions in each area.

As an example of a measurement method for the radiation temperature, description is made of the case of the air-conditioning target space at the air outlet **2***c*. The human body position detection unit **11** measures radiation temperatures in the area x**1** at a plurality of positions in each area in the order of (x**1**, y**1**), (x**1**, y**2**), and (x**1**, y**3**). Subsequently, similarly to the case of the area x**1**, the human body position detection unit **11** measures radiation temperatures at a plurality of positions in each area in the order of the area x**2** and the area x**3**.

When an instruction to activate is received from the controller **33**, the human body position detection unit **11** measures radiation temperatures at a plurality of positions for each of thirty-six areas. The human body position detection unit **11** outputs, to the controller **33**, radiation temperature data including a pair of information of the areas subjected to measurement and radiation temperatures at a plurality of positions measured in the areas subjected to measurement.

When the radiation temperature data is received from the human body position detection unit **11**, the controller **33** compares the radiation temperature data with the area map illustrated in FIG. **14**, and generates human body position distribution indicating whether or not a person is present per area. The controller **33** refers to the generated human body position distribution, and controls the up-and-down airflow direction adjusters **4***a* to **4***d* and the plurality of right-and-left airflow direction adjusters **6** to operate in association with each other so that the blowing direction of the air is switched per area among the plurality of areas for which the human body position detection unit has detected presence of a person.

The human body position detection unit **11** is provided at a corner portion of the lower surface **31** of the indoor unit **30***a*. However, the positions of the areas of the radiation temperature data received by the controller **33** from the human body position detection unit **11** are corrected to positions with the center of the indoor unit **30***a* as a reference as illustrated in FIG. **14**. Description is made of an example of a determination method for the presence or absence of a person in each area. The controller **33** calculates an average value of the plurality of radiation temperatures included in the radiation temperature data. When the average value is equal to or larger than a threshold value, it is determined that a person is present in the area subjected to the determination. When the average value is smaller than the threshold value, it is determined that a person is absent in the area subjected to the determination. This threshold value is a value which serves as a reference for indicating whether or not the measurement value of the radiation temperature is a temperature caused by radiation heat radiated from a human body. This threshold value is stored in the memory **35**. In the following, among the plurality of areas, an area in which a person is present is referred to as "person-present area", and an area in which a person is absent is referred to as "person-absent area".

Next, description is made of an operation of the air-conditioning apparatus in Embodiment 3. FIG. **15** is a flowchart for illustrating a procedure of airflow direction control performed by the indoor unit for the air-conditioning apparatus according to Embodiment 3 of the present invention. FIG. **16** to FIG. **18** are views for illustrating an example of a case in which the person-present area differs in the air-conditioning target space of the air-conditioning apparatus in Embodiment 3 of the present invention. In FIG. **16** to FIG. **18**, a position of a person is indicated by a circle. In FIG. **16** to FIG. **18**, for ease of description, each area is not divided into the area y**1** to the area y**3**.

As illustrated in FIG. **15**, when an instruction to set the automatic operation to the up-and-down airflow direction and the right-and-left airflow direction is input (Step S**101**), the controller **33** activates the human body position detection unit **11** (Step S**102**). When the radiation temperature data for each area is collected from the human body position detection unit **11**, the controller **33** generates human body position distribution for the air-conditioning target space of each of the air outlets **2***a* to **2***d* (Step S**103**). In Step S**104** to Step S**109**, the controller **33** performs determination in Step S**105** for each of the air outlets **2***a* to **2***d*, and performs processing of any one of Step S**106** to Step S**108** in accordance with a determination result. With reference to FIG. **16** to FIG. **18**, description is made of the operation in the case of the air outlet **2***c*.

FIG. **16** is an illustration of a case in which one person-present area is present among the plurality of areas in Embodiment 3 of the present invention. In the case illustrated in FIG. **16**, in accordance with a result given in Step S**105**, the controller **33** proceeds to the processing of Step S**106**. The controller **33** causes the airflow direction of the up-and-down airflow direction adjuster **4***c* to swing, to thereby cause the airflow direction of the right-and-left airflow direction adjuster **6** to be directed to the person-present area x**1** (Step S**106**). In Step S**106**, in a case of controlling the blowing direction of the air per area also with regard to the area y**1** to the area y**3** illustrated in FIG. **14**, the controller **33** may cause the airflow direction of the up-and-down airflow direction adjuster **4***c* to be fixed to the person-present area. In this case, the right-and-left direction of the blowing direction of the air is fixed to the person-present area x**1**, and the up-and-down direction is caused to swing or fixed to the person-present area, thereby being capable of automatically sending air to a person.

FIG. **17** is an illustration of a case in which two person-present areas are present among the plurality of areas in Embodiment 3 of the present invention. In the case illustrated in FIG. **17**, in accordance with the result given in Step S**105**, the controller **33** proceeds to the processing of Step S**107**. The controller **33** causes the airflow direction of the up-and-down airflow direction adjuster **4***c* to swing, to thereby cause the airflow direction of the right-and-left airflow direction adjuster **6** to swing between the person-present area x**1** and the person-present x**2** (Step S**107**). In Step S**107**, in the case of controlling the blowing direction of the air per area also with regard to the area y**1** to area y**3**, the controller **33** may cause the airflow direction of the up-and-down airflow direction adjuster **4***c* to be fixed to the person-present area. In this case, the right-and-left direction of the blowing direction of the air is caused to swing to the person-present areas x**1** and the person-present area x**2**, and the up-and-down direction is caused to swing or fixed to the person-present areas, thereby being capable of automatically sending air to a person.

FIG. **18** is an illustration of a case in which a person-absent area is sandwiched between two person-present areas in Embodiment 3 of the present invention. In the case illustrated in FIG. **18**, in accordance with the result given in Step S**105**, the controller **33** proceeds to the processing of Step S**107**. The controller **33** causes the airflow direction of the up-and-down airflow direction adjuster **4***c* to swing, to thereby cause the airflow direction of the right-and-left airflow direction adjuster **6** to swing between the person-present area x**1** and area x**3** (Step S**107**). In Step S**107**, in the case of controlling the blowing direction of the air per area also with regard to the area y**1** to area y**3**, the controller **33** may cause the airflow direction of the up-and-down airflow direction adjuster **4***c* to be fixed to the person-present area. In this case, the right-and-left direction of the blowing direction of the air is caused to swing to the person-present area x**1** to area x**2**, and the up-and-down direction is caused to swing or fixed to the person-present areas, thereby being capable of automatically sending air to a person.

In the determination in Step S**105** illustrated in FIG. **15**, when the person-present area is not detected, the controller **33** fixes the airflow direction of the up-and-down airflow direction adjuster **4***c*, and causes the airflow direction of the right-and-left airflow direction adjuster **6** to swing (Step S**108**). Description is made of the reason why the controller **33** causes the right-and-left airflow direction adjuster **6** to perform the swing operation even though the person-present area is not detected in the air-conditioning target space. The temperature in the air-conditioning target space of the air outlet **2***c* is set to be even. Consequently, when a user moves from the air-conditioning target space of an other air outlet **2***a*, **2***b*, or **2***d* to the air-conditioning target space of the air outlet **2***c*, the user is not caused to feel uncomfortable.

Further, in Step S**108**, when the airflow direction of the up-and-down airflow direction adjuster **4***c* is to be fixed, the controller **33** may fix the airflow direction of the up-and-down airflow direction adjuster **4***c* in a direction which is the same as that of the up-and-down airflow direction adjuster at any one of the air outlets **2***a* and **2***d* adjacent to the air outlet **2***c*. In this case, when a user is present in the air-conditioning target space of any of the air outlets **2***a* and **2***d*, the evenness in temperature is improved in a band-like area in a coaxial circle about the indoor unit **30***a* as a center of the circle. For example, when a user is present in the area y**2** of the air-conditioning target space of the air outlet **2***a*, evenness in temperature in areas y**2** of the air-conditioning target spaces of the air outlets **2***a* and **2***c* is improved.

In the procedure illustrated in FIG. **15**, when the controller **33** performs control of switching the blowing direction of the air per person-present area to be directed to the air-conditioning target spaces of all of the air outlets **2***a* to **2***d* (Step S**109**), the processing returns to Step S**102**. The controller **33** repeats the processing of Step S**102** to Step S**109** at constant cycles, and hence, even when a user moves in the indoor space, the control of switching the blowing direction of the air to be directed to an area of a destination of the user can be continued.

In Embodiment 3, description has been made of the case in which the human body position detection unit **11** outputs, to the controller **33**, the radiation temperature data including the pair of information of the areas subjected to measurement and the radiation temperatures at the plurality of positions measured in the areas subjected to measurement. However, information indicating whether or not a person is present may be used in place of the radiation temperature. In this case, the human body position detection unit **11** outputs, to the controller **33**, human body presence-absence data including the pair of information of the areas subjected to measurement and the information indicating whether or not a person is present in the area subjected to measurement. It is only required that the controller **33**, after receiving the human body presence-absence data from the human body position detection unit **11**, compare the human body presence-absence data with the area map and generate human body position distribution indicating whether or not a person is present per area.

In the indoor unit **30***a* for the air-conditioning apparatus **1** according to Embodiment 3, the controller **33** controls the up-and-down airflow direction adjusters **4***a* to **4***d* and the right-and-left airflow direction adjusters **6** to operate in association with each other, to thereby cause the blowing direction of the air to be directed to an area detected by the human body position detection unit **11** that a person is present among the plurality of areas of the air-conditioning target space.

According to Embodiment 3, the controller **33** specifies a person-present area from among the plurality of areas in the air-conditioning target space and performs the control of associating the up-and-down airflow direction and the right-and-left airflow direction with each other for the person-present area, thereby being capable of automatically blowing air against the area in which a person is present. As a result, air can automatically be blown against a person. Further, comfortability of a person who requests air to be blown from the air-conditioning apparatus is improved. Through the operation of preventing air from being blown against an area in which a person is not present, energy-saving performance is improved.

Embodiment 4

The air-conditioning apparatus in Embodiment 3 is configured to perform control of specifying a position of a human body and automatically blowing air against a person, in addition to the control of causing the up-and-down airflow direction adjusters **4***a* to **4***d* and the plurality of right-and-left airflow direction adjusters **6** to operate in association with each other. An air-conditioning apparatus in Embodiment 4 of the present invention is configured to automatically control the airflow direction so that air is not blown against a person who is in the air-conditioning target space. There is difference in sensible temperature depending on a person, and hence Embodiment 4 is suitable for a person who feels uncomfortable when air is directly blown from the air-conditioning apparatus.

The air-conditioning apparatus in Embodiment 4 is different from the air-conditioning apparatus described in Embodiment 3 only in control method. Consequently, description of a configuration of the air-conditioning apparatus in Embodiment 4 is omitted.

Description is made of an operation of the air-conditioning apparatus in Embodiment 4. FIG. **19** is a flowchart for illustrating a procedure of airflow direction control performed by the indoor unit for the air-conditioning apparatus according to Embodiment 4 of the present invention. FIG. **20** to FIG. **22** are views for illustrating an example of a case in which the person-present area differs in the air-conditioning target space of the air-conditioning apparatus in Embodiment 4 of the present invention. In FIG. **20** to FIG. **22**, a position of a person is indicated by a circle. In FIG. **20** to FIG. **22**, for ease of description, each area is not divided into the area y**1** to the area y**3**. Further, in Embodiment 4, Step S**101** to Step S**105** of the procedure illustrated in FIG. **19** are the same as the processing described with reference to FIG. **15**, and hence detailed description of the same processing is omitted.

In Step S**103** illustrated in FIG. **19**, the controller **33** generates human body position distribution in the air-conditioning target space of each of the air outlets **2***a* to **2***d*. Then, the controller **33** performs the determination in Step S**105** for each of the air outlets **2***a* to **2***d*, and performs the processing of any one of Step S**111** to Step S**113** in accordance with a determination result. With reference to FIG. **20** to FIG. **22**, description is mainly made of the operation in the case of the air outlet **2***c*.

FIG. **20** is an illustration of a case in which one person-present area is present among the plurality of areas in Embodiment 4 of the present invention. In the case illustrated in FIG. **20**, as a result of Step S**105**, the controller **33** proceeds to the processing of Step S**111**. The controller **33** fixes the airflow direction of the up-and-down airflow direction adjuster **4***c* to the upper side or the person-absent area, and causes the airflow direction of the right-and-left airflow direction adjuster **6** to be directed to the person-absent area (Step S**111**).

In the example illustrated in FIG. **20**, illustration is given of the case in which the controller **33** causes the airflow direction of the right-and-left airflow direction adjuster **6** to be directed to the person-absent area x**3** among the person-absent the area x**2** and the area x**3**. In this case, the person-absent area x**2** is present between the area x**3** being the blowing direction of the air and the person-present area x**1**, and hence air is sent to the area x**3** apart from the person-present area x**1**. As a result, the draft feeling of a user who is in the area x**1** can further be reduced.

In such a manner, the right-and-left direction of the blowing direction of the air is fixed to the person-absent area x**3**, and the up-and-down direction is fixed, thereby being capable of automatically preventing air from being blown against a user. As a result of determination in Step S**105**, even when a plurality of person-present areas are present, and a person-absent area is present, the controller **33** fixes the airflow direction of the up-and-down airflow direction adjuster **4***c* to the upper side or the person-absent area, and causes the airflow direction of the right-and-left airflow direction adjuster **6** to be directed to the person-absent area (Step S**112**). In this case, the effect similar to that of the case of Step S**111** can be obtained.

When the airflow direction control for the air outlet **2***c* is to be performed, the controller **33** may refer to a person-present area in the air-conditioning target space of each of the outlets **2***a* and **2***d* adjacent to the air outlets **2***c*. Description is made of this case with reference to FIG. **21**. FIG. **21** is a collective illustration of presence or absence of a person-present area among the plurality of areas for each of three outlets in Embodiment 4 of the present invention. In Step S**103** illustrated in FIG. **19**, the controller **33** generates human body position distribution for each of the air outlets **2***a* to **2***d* and stores the same in the memory **35**. The human body position distribution given in this case is illustrated in FIG. **21**. However, in FIG. **21**, illustration of the human body position distribution for the air outlet **2***b* is omitted.

FIG. **21** is an illustration of a case in which, with regard to the air-conditioning target space of the air outlet **2***a*, the area x**3** is a person-present area, and the area x**1** and the area x**2** are person-absent areas. Further, FIG. **21** is an illustration of a case in which, with regard to the air-conditioning target space of the air outlet **2***c*, the area x**2** is a person-present area, and the area x**1** and the area x**3** are person-absent areas. FIG. **21** is an illustration of a case in which, with regard to the air-conditioning target space of the air outlet **2***d*, the area x**2** is a person-present area, and the area x**1** and the area x**3** are person-absent areas.

As a result of determination in Step S**105** with regard to the air outlet **2***c*, when the controller **33** determines that one person-present area is present, the controller **33** fixes the airflow direction of the up-and-down airflow direction adjuster **4***c* to the upper side or the person-absent area, and causes the airflow direction of the right-and-left airflow direction adjuster **6** to be directed to the person-absent area (Step S**111**). It is conceivable that, in Step S**111**, the controller **33** selects any one of the area x**1** and the area x**3** when the airflow direction of the right-and-left airflow direction adjuster **6** is to be directed to the person-absent area. In this case, the controller **33** refers to the human body position distribution illustrated in FIG. **21**, to thereby determine that the area x**3** of the air outlet **2***a* is a person-present area, whereas the area x**1** of the air outlet **2***d* is a person-absent area. Only one person-absent area is present between the person-present area x**2** of the air outlet **2***c* and the person-present area x**3** of the air outlet **2***a*, but two person-absent areas are present between the person-present area x**2** of the air outlet **2***c* and the person-present area x**2** of the air outlet **2***d*. In this case, the controller **33** selects the area x**3** from the area x**1** and the area x**3** of the air outlet **2***c* as a destination of the airflow direction of the right-and-left airflow direction adjuster **6**.

In such a manner, when the airflow direction control for the air outlet **2***c* is to be performed, the controller **33** selects the blowing direction of the air to be directed to the area in which a ratio of presence of a person is smallest on the basis of not only the human body position distribution of the air outlet **2***c* but also the human body position distribution of the adjacent air outlets **2***a* and **2***d*. As a result, air is sent from the indoor unit **30** to the area in which the ratio of presence of a person is smallest, thereby being capable of preventing air from being directly blown against a user.

FIG. **22** is an illustration of a case in which the person-absent area is not present among the plurality of areas in Embodiment 4 of the present invention. In Step S**105** illustrated in FIG. **19**, when it is determined that the person-absent area is zero, the controller **33** proceeds to the processing of Step S**113**. The controller **33** fixes the airflow direction of the up-and-down airflow direction adjuster **4***c* to the upper side, and causes the airflow direction of the right-and-left airflow direction adjuster **6** to swing (Step S**113**). FIG. **22** is an illustration of a case in which the controller **33** causes the airflow direction of the right-and-left airflow direction adjuster **6** to swing among the area x**1** to the area x**3**. In this case, the airflow direction of the up-and-down airflow direction adjuster **4***c* is directed to the upper side, and hence the air sent from the air outlet **2***c* flows along the ceiling, thereby being capable of preventing air from being directly blown against a user. Further, the airflow direction of the right-and-left airflow direction adjuster **6** swings, and hence the flow of air is diffused, thereby being capable of preventing air from being intensively blown against one area.

As described above with reference to FIG. **20** to FIG. **22**, the controller **33** fixes the airflow direction of the up-and-down airflow direction adjuster **4***c* to the upper side or the person-absent area, and causes the airflow direction of the right-and-left airflow direction adjuster **6** to be directed to the person-absent area apart from the person-present area, thereby being capable of preventing air from being blown against a user.

In the indoor unit **30***a* for the air-conditioning apparatus **1** according to Embodiment 4, the controller **33** controls the up-and-down airflow direction adjusters **4***a* to **4***d* and the right-and-left airflow direction adjusters **6** to operate in association with each other, to thereby cause the blowing direction of the air to be directed to an area which is detected by the human body position detection unit **11** that a person is absent among the plurality of areas of the air-conditioning target space.

According to Embodiment 4, the controller **33** specifies a person-absent area from the plurality of areas of the air-conditioning target space and performs the control of causing the up-and-down airflow direction and the right-and-left air flow direction to operate in association with each other for the person-absent area, thereby being capable of automatically causing air to be blown against an area in which a person is absent. As a result, air can be automatically prevented from being directly blown against a person. Further, for a person who feels uncomfortable by air being directly blown from the air-conditioning apparatus, the draft feeling is reduced, and comfortability is improved.

Embodiment 5

The air-conditioning apparatus in Embodiments 3 and 4 are configured to perform control of specifying a position of a human body and send air to a person or prevent air from being sent to the person, in addition to the control of causing the up-and-down airflow direction adjusters **4***a* to **4***d* and the plurality of right-and-left airflow direction adjusters **6** to operate in association with each other. An air-conditioning apparatus in Embodiment 5 of the present invention is configured to automatically detect temperature unevenness in the air-conditioning target space and provide an air-conditioned space with even temperature and without temperature unevenness.

Description is made of a configuration of the air-conditioning apparatus in Embodiment 5. In Embodiment 5, detailed description of the configurations similar to those of Embodiments 1 to 3 is omitted, and features different from those of Embodiments 1 to 3 are described in detail.

FIG. **23** is a plan view of an indoor unit for an air-conditioning apparatus according to Embodiment 5 of the present invention as seen from a lower surface side. As illustrated in FIG. **23**, a radiation temperature measurement unit **12** is provided on the lower surface **31** of an indoor unit **30***b*. In the indoor unit **30***b* illustrated in FIG. **23**, the radiation temperature measurement unit **12** is provided on the lower surface **31** at a position diagonal to the temperature measurement unit **5**. The position at which the radiation temperature measurement unit **12** is provided is not limited to the position illustrated in FIG. **13**. The controller **33** is connected to the radiation temperature measurement unit **12** by a signal line. In Embodiment 5, the radiation temperature measurement unit **12** is an infrared sensor.

Also with regard to the indoor unit **30***b* of Embodiment 5, as described above with reference to FIG. **14**, the air-conditioning target space of each of the air outlets **2***a* to **2***d* is divided into nine areas. The radiation temperature measurement unit **12** measures a radiation temperature of a floor for each position specified by a distance form a reference position and an azimuth angle which are set for the indoor unit **30***b*. In Embodiment 5, the radiation temperature measurement unit **12** measures radiation temperatures at a plurality of positions for each area illustrated in FIG. **14**. When an instruction to activate is received from the controller **33**, the radiation temperature measurement unit **12** measures radiation temperatures at the plurality of positions for each of thirty-six areas. The radiation temperature measurement unit **12** outputs, to the controller **33**, radiation temperature data including a pair of information of the areas subjected to measurement and radiation temperatures at the plurality of positions measured in the areas subjected to measurement.

When the radiation temperature data is received from the radiation temperature measurement unit **12**, the controller **33** compares the radiation temperature data with the area map illustrated in FIG. **14**, and calculates an average value of the plurality of radiation temperatures included in the radiation temperature data for each area. The controller **33** sets the calculated average value of the radiation temperature for each area as a floor temperature of that area. The controller **33** writes in the floor temperature of each area to the area map illustrated in FIG. **14**, to thereby generate floor temperature distribution.

In a case in which the operation state of the air-conditioning apparatus **1** is a heating operation, the controller **33** refers to the floor temperature distribution, and controls the up-and-down airflow direction adjusters **4***a* to **4***d* and the plurality of right-and-left airflow direction adjusters **6** to operate in association with each other so that the blowing direction of the air is directed to an area with the lowest floor temperature among the plurality of areas. Further, in a case in which the operation state of the air-conditioning apparatus **1** is a cooling operation, the controller **33** refers to the floor temperature distribution, and controls the up-and-down airflow direction adjusters **4***a* to **4***d* and the plurality of right-and-left airflow direction adjusters **6** to operate in association with each other so that the blowing direction of the air is directed to an area with the highest floor temperature among the plurality of areas.

Next, description is made of an operation of the air-conditioning apparatus in Embodiment 5. FIG. **24** is a flowchart for illustrating a procedure of airflow direction control performed by the indoor unit for the air-conditioning apparatus according to Embodiment 5 of the present invention. FIG. **25** is an illustration of an example of a case in which an area having a floor temperature lower than floor temperatures of other areas among the plurality of areas is present in Embodiment 5 of the present invention. FIG. **26** is an illustration of an example of a case in which an area having a floor temperature higher than floor temperatures of other areas among the plurality of areas is present in Embodiment 5 of the present invention. In FIG. **25** and FIG. **26**, for ease of description, each area is not divided into the area y**1** to the area y**3**.

As illustrated in FIG. **24**, when the instruction to set the automatic operation to the up-and-down airflow direction and the right-and-left airflow direction is input (Step S**101**), the controller **33** activates the radiation temperature measurement unit **12** (Step S**121**). When the radiation temperature data for each area is collected from the radiation temperature measurement unit **12**, the controller **33** generates floor temperature distribution for the air-conditioning target space of each of the air outlets **2***a* to **2***d* (Step S**122**). In Step S**123** to Step S**126**, the controller **33** performs determination in Step S**124** for each of the air outlets **2***a* to **2***d*, and performs processing of any one of Step S**125** and Step S**126** in accordance with a determination result.

First, with reference to FIG. **25**, description is made of airflow direction control to be performed by the indoor unit **30***b* for the air outlet **2***c* in the case in which the operation state of the air-conditioning apparatus **1** is the heating operation. With the determination in Step S**124** illustrated in FIG. **24**, when it is determined that the operation state of the air-conditioning apparatus **1** is the heating operation, the controller **33** proceeds to Step S**125**. In Step S**125**, the controller **33** refers to the floor temperature distribution to control the up-and-down airflow direction adjuster **4***c* and the right-and-left airflow direction adjuster **6** to operate in association with each other so that the blowing direction of the air is directed to the area with the lowest floor temperature among the plurality of areas. FIG. **25** is an illustration indicating that the area x**1** illustrated with a dot pattern has a temperature lower than those of the other area x**2** and the other area x**3**.

In the case of the example illustrated in FIG. **25**, in Step S**125**, the controller **33** causes the airflow direction of the right-and-left airflow direction adjuster **6** to be directed to the area x**1**, and causes the airflow direction of the up-and-down airflow direction adjuster **4***c* to swing. In Step S**125**, in a case of controlling the blowing direction of the air per area with regard to the area y**1** to the area y**3** illustrated in FIG. **14**, the controller **33** may fix the airflow direction of the up-and-down airflow direction adjuster **4***c* to an area having a low floor temperature.

In the case in which the operation state of the air-conditioning apparatus **1** is the heating operation, of the blowing direction of the air, the right-and-left direction is fixed to the area x**1** with the lowest floor temperature, and the up-and-down direction is caused to swing to a plurality of areas or fixed to the area with the lowest floor temperature. As a result, warm air can be preferentially allocated to the area with the lowest floor temperature.

Next, with reference to FIG. **26**, description is made of airflow direction control to be performed by the indoor unit **30***b* for the air outlets **2***a* and **2***c* in the case in which the operation state of the air-conditioning apparatus **1** is the cooling operation. In a procedure illustrated in FIG. **24**, in the case of the air outlet **2***a* (Step S**123**), with the determination in Step S**124**, when it is determined that the operation state of the air-conditioning apparatus **1** is the cooling operation, the controller **33** proceeds to Step S**126**. In Step S**126**, the controller **33** refers to the floor temperature distribution to control the up-and-down airflow direction adjuster **4***a* and the right-and-left airflow direction adjuster **6** to operate in association with each other so that the blowing direction of the air is directed to the area with the highest floor temperature among the plurality of areas. FIG. **26** is an illustration indicating that the area x**3** illustrated with a dot pattern has a temperature higher than those of other area x**1** and other area x**2** among the plurality of areas of the air outlet **2***a*.

In the case of the example illustrated in FIG. **26**, in Step S**126**, the controller **33** causes the airflow direction of the right-and-left airflow direction adjuster **6** to be directed to the area x**3** of the air outlet **2***a*, and causes the airflow direction of the up-and-down airflow direction adjuster **4***a* to swing. In Step S**126**, in the case of controlling the blowing direction of the air per area with regard to the areas y**1** to the area y**3** illustrated in FIG. **14**, the controller **33** may fix the airflow direction of the up-and-down airflow direction adjuster **4***a* to an area having a high floor temperature.

Next, description is made of the airflow direction control for the case of the air outlet **2***c* in Step S**123** illustrated in FIG. **24**. FIG. **26** is an illustration indicating that the area x**1** illustrated with a dot pattern has a temperature higher than those of other area x**2** and other area x**3** among the plurality of areas of the air outlet **2***c*. In Step S**126**, the controller **33** causes the airflow direction of the right-and-left airflow direction adjuster **6** to be directed to the area x**3**, and causes the airflow direction of the up-and-down airflow direction adjuster **4***c* to swing. In Step S**126**, in the case of controlling the blowing direction of the air per area to be directed to the area y**1** to the area y**3** illustrated in FIG. **14**, the controller **33** may fix the airflow direction of the up-and-down airflow direction adjuster **4***a* to an area having a high floor temperature.

In the case in which the operation state of the air-conditioning apparatus **1** is the cooling operation, of the blowing direction of the air, the right-and-left direction is fixed to the area with the highest floor temperature, and the up-and-down direction is caused to swing to the plurality of areas or fixed to the area with the highest floor temperature. As a result, cool air can be preferentially allocated to the area with the highest floor temperature. As described above, in any of the cases in which the operation state of the air-conditioning apparatus **1** is the heating operation or the cooling operation, a portion with the temperature unevenness can be automatically and intensively air-conditioned.

In the indoor unit **30***b* for the air-conditioning apparatus **1** according to Embodiment 5, the controller **33** causes the blowing direction of the air to be directed to an area with the highest floor temperature among the plurality of floor temperatures during the cooling operation, and causes the blowing direction of the air to be directed to an area with the lowest floor temperature among the plurality of floor temperatures during the heating operation.

According to Embodiment 5, the controller **33** detects the temperature unevenness of the floor temperatures at the plurality of areas in the air-conditioning target space, and controls the up-and-down airflow direction and the right-and-left airflow direction in association with each other so that the blowing direction of the air is directed to an area in which the floor temperature is the most different among the floor temperatures at the plurality of areas. Consequently, the temperature unevenness is reduced more rapidly in the air-conditioning target space, thereby being capable of attaining even temperature. Further, the air-conditioning apparatus **1** performs the control similar to the above-mentioned control for each of the four air outlets **2***a* to **2***d*, thereby being capable of promptly attaining even temperature in the entire room. Further, the air-conditioning apparatus **1** can shorten the time required for improving the heating performance and the cooling performance, thereby being capable of also achieving energy-saving performance.

The configurations and the operations of the air-conditioning apparatus in Embodiments 1 to 5 described above are examples, and the configurations and operations of those embodiments may be combined.

REFERENCE SIGNS LIST

1 air-conditioning apparatus **2***a* to **2***d* air outlet **3** air inlet **4***a* to **4***d* up-and-down airflow direction adjuster **5** temperature measurement unit **6** right-and-left airflow direction adjuster **7** load-side heat exchanger **8** air-sending unit **10** humidity measurement unit **11** human body position detection unit **12** radiation temperature measurement unit **20** outdoor unit **21** compressor **22** four-way valve **23** heat source-side heat exchanger **24** expansion valve **25** refrigerant circuit **30**, **30***a*, **30***b* indoor unit **31** lower surface **32***a* upper casing **32***b* lower casing **33** controller **35** memory **36** CPU **37**, **38** drive unit **41** up-and-down vane **42** shaft portion **45** upper side **46** middle **47** lower side **51** to **53**, **55** to **58** arrow **61***a*, **61***b* right-and-left vane **62** hinge **63** shaft portion

The invention claimed is:

1. An indoor unit for an air-conditioning apparatus, comprising:

a fan configured to send air subjected to heat exchange with refrigerant to an air-conditioning target space through an air outlet, the air-conditioning target space being divided into a plurality of areas;

an up-and-down airflow direction adjusting vane provided at the air outlet, and configured to adjust an angle in an up-and-down direction of a blowing direction of the air sent through the air outlet;

a right-and-left airflow direction adjusting vane provided at the air outlet, and configured to adjust an angle in a right-and-left direction of the blowing direction of the air sent through the air outlet; and

a controller configured to control the angle of the up-and-down airflow direction adjusting vane and the angle of the right-and-left airflow direction adjusting vane,

the controller being configured to control the up-and-down airflow direction adjusting vane and the right-and-left airflow direction adjusting vane to continuously and simultaneously change the angle in the up-and-down direction and the angle in the right-and-left direction such that the blowing direction of the air is switched to areas of the plurality of areas,

wherein,

when a heating operation is performed, the controller is configured to set, in entire time for switching the blowing direction of the air per area, a ratio of time for an area having a shortest distance to be larger than a ratio of time for other areas in the direction in which the distance from the air outlet as the reference increases.

2. An indoor unit for an air-conditioning apparatus, comprising:

a fan configured to send air subjected to heat exchange with refrigerant to an air-conditioning target space through an air outlet, the air-conditioning target space being divided into a plurality of areas;

an up-and-down airflow direction adjusting vane provided at the air outlet, and configured to adjust an angle in an up-and-down direction of a blowing direction of the air sent through the air outlet;

a right-and-left airflow direction adjusting vane provided at the air outlet, and configured to adjust an angle in a right-and-left direction of the blowing direction of the air sent through the air outlet; and

a controller configured to control the angle of the up-and-down airflow direction adjusting vane and the angle of the right-and-left airflow direction adjusting vane,

the controller being configured to control the up-and-down airflow direction adjusting vane and the right-and-left airflow direction adjusting vane to continuously change the angle in the up-and-down direction and the angle in the right-and-left direction such that the blowing direction of the air is switched to areas of the plurality of areas,

wherein

the plurality of areas are areas divided in a direction in which a distance from the air outlet as a reference increases and in a direction horizontal to the reference, and

when a heating operation is performed, the controller is configured to set, in entire time for switching the blowing direction of the air per area, a ratio of time for an area having a shortest distance to be larger than a ratio of time for other areas in the direction in which the distance from the air outlet as the reference increases.

3. The indoor unit for an air-conditioning apparatus of claim **1**, wherein the controller is configured to simultaneously control the up-and-down airflow direction adjusting vane and the right-and-left airflow direction adjusting vane to operate in association with each other such that a trajectory of the blowing direction of the air to the plurality of areas is 8-shaped.

4. The indoor unit for an air-conditioning apparatus of claim **2**, further comprising a human body position detection sensor configured to detect whether or not a person is present for each of the plurality of areas,

wherein the controller is configured to control the up-and-down airflow direction adjusting vane and the right-and-left airflow direction adjusting vane to operate in association with each other to cause the blowing direction of the air to be directed to an area, among the plurality of areas, detected by the human body position detection sensor in which a person is present.

5. The indoor unit for an air-conditioning apparatus of claim **2**, further comprising a human body position detection sensor configured to detect whether or not a person is present for each of the plurality of areas,

wherein the controller is configured to control the up-and-down airflow direction adjusting vane and the right-and-left airflow direction adjusting vane to operate in association with each other to cause the blowing direction of the air to be directed to an area, among the plurality of areas, detected by the human body position detection sensor in which a person is absent.

6. The indoor unit for an air-conditioning apparatus of claim **1**, further comprising a radiation temperature measurement sensor configured to measure a floor temperature for each of the plurality of areas,

wherein, when a cooling operation is performed, the controller is configured to cause the blowing direction of the air to be directed to an area having a highest floor temperature among a plurality of floor temperatures measured by the radiation temperature measurement sensor for the plurality of areas, and

wherein, when a heating operation is performed, the controller is configured to cause the blowing direction of the air to be directed to an area having a lowest floor temperature among the plurality of floor temperatures.

7. The indoor unit for an air-conditioning apparatus of claim **1**, further comprising a temperature measurement sensor configured to measure a temperature of air to be sucked in from the air-conditioning target space,

wherein, when a cooling operation is performed and the temperature measured by the temperature measurement sensor does not fall within a range determined for a set temperature, the controller is configured to control the angle of the up-and-down airflow direction adjusting vane and the angle of the right-and-left airflow direction adjusting vane.

8. The indoor unit for an air-conditioning apparatus of claim **1**, further comprising a humidity measurement sensor configured to measure a humidity of air to be sucked in from the air-conditioning target space,

wherein, when a cooling operation is performed and the humidity measured by the humidity measurement sensor does not fall within a range determined for a set humidity, the controller is configured to control the angle of the up-and-down airflow direction adjusting vane and the angle of the right-and-left airflow direction adjusting vane.

9. The indoor unit for an air-conditioning apparatus of claim **2**, further comprising a radiation temperature measurement sensor configured to measure a floor temperature for each of the plurality of areas,

wherein, when a cooling operation is performed, the controller is configured to cause the blowing direction of the air to be directed to an area having a highest floor temperature among a plurality of floor temperatures measured by the radiation temperature measurement sensor for the plurality of areas, and

wherein, when a heating operation is performed, the controller is configured to cause the blowing direction of the air to be directed to an area having a lowest floor temperature among the plurality of floor temperatures.

10. The indoor unit for an air-conditioning apparatus of claim **2**, further comprising a temperature measurement sensor configured to measure a temperature of air to be sucked in from the air-conditioning target space,

wherein, when a cooling operation is performed and the temperature measured by the temperature measurement sensor does not fall within a range determined for a set temperature, the controller is configured to control the angle of the up-and-down airflow direction adjusting vane and the angle of the right-and-left airflow direction adjusting vane.

11. The indoor unit for an air-conditioning apparatus of claim **2**, further comprising a humidity measurement sensor configured to measure a humidity of air to be sucked in from the air-conditioning target space,

wherein, when a cooling operation is performed and the humidity measured by the humidity measurement sensor does not fall within a range determined for a set humidity, the controller is configured to control the angle of the up-and-down airflow direction adjusting vane and the angle of the right-and-left airflow direction adjusting vane.

12. The indoor unit for an air-conditioning apparatus of claim **4**, wherein the controller is further configured to control the up-and-down direction adjusting vane to continuously change the angle in the up-and-down direction in the area detected by the human body position sensor in which the person is present.

13. The indoor unit for an air-conditioning apparatus of claim **2**, further comprising

a human body position detection sensor configured to detect whether or not a person is present for each of the plurality of areas,

wherein the controller is further configured to control the up-and-down direction adjusting vane to fix the angle in the up-and-down direction irrespective of whether the human body position sensor detects a person in an area.

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